VOL. XIV No. 17 CHICAGO, OCTOBER 22, 1908 $3.00 PER YEAR

MOTOR AGE

NOW FOR THE FOURTH VANDERBILT RACE!

NEW YORK, Oct. 20—Beginning at daylight next Saturday morning will be run the fourth race for the William K. Vanderbilt, Jr., cup over eleven laps of a 23.453-mile course, aggregating 257.983 miles. Seven European and twelve American cars have drawn starting numbers. They embrace for the most part cars of established records and in the matter of pilots proven long-distance performers. In their number and the variety of their makes they are adequately representative of the fastest and most enduring brands of the foreign and domestic product. Some of them were contenders in the last Vanderbilt race. In one of the two Locomobiles Joseph Tracy scored the fastest lap of the last contest, and the Thomas George Salzman is to pilot with LeBlon at the wheel finished ahead of all the American cars in that memorable struggle. The Mercedes entered by Robert Graves was piloted by Jenatzy in the last race, and the Hotchkiss, to be driven by Kilpatrick, is said to be a duplicate of the car that Elliot F. Shepard used. A second of the 1906 Vanderbilt Thomases will have at its wheel Howard W. Gill, a Baltimore amateur. The third Thomas candidate is the Thomas used by Louis Strang in the grand prix race this year. Foxhall P. Keene will again drive his former Mercedes. Two other contenders were built for the last Vanderbilt—a Locomobile as an emergency substitute for Tracy's car in the event of an accident in practice, and a B. L. M. not completed in time to compete in this race.

Two of the new candidates for cup honors among the cars already have won distinction—the Isotta by its succession of triumphs in the Savannah, Briarcliff, Lowell and Sweepstakes races, the Knox by finishing second in the Lowell contest, and the Acme by evolving third at Savannah and second at Philadelphia.

Interesting as will be the meeting of these seasoned racers and the addition of much new speed blood, it will not compare with the excitement of the competition among the coterie of daring, skillful and competent drivers long-distance racing in this country has developed in the past 2 years. Public attention is to a considerable extent centered on a trio of drivers, whose performances during the past season and successes in very recent races have placed them at the head of the American speed squadron. Herbert Lytle, who was a Pope-Toledo pilot of former Vanderbilt races, is to man the Isotta he drove to victory in the Motor Parkway sweepstakes. Louis Strang, who was at the wheel of the Isotta at Savannah, Briarcliff and Lowell, is to drive for Paul LaCroix the Renault that put up a new world's record for 100 miles on Ormond beach. Strang's stirring struggle in the stock car Renault in the last 24-hour race at Brighton Beach, in which he alternated in the lead with the Isotta until his car was put out of the running by an accident, is fresh in the public mind, followed as it was by

1—ROBERTSON, LOCOMOBILE 2—STRANG, RENAULT 3—LYTLE, ISOTTA 4—SALZMAN, THOMAS

HEADQUARTERS OF THE MATHESON AND THE LOCOMOBILE ON THE VANDERBILT CUP COURSE

his close pursuit of Lytle in the sweepstakes, also in a 40-45-horsepower stock car. The third member of the rival trio, George Robertson, will pilot the Locomobile he drove to victory at Philadelphia, following his capture of the last Brighton Beach 24-hour race in a Simplex.

William K. Vanderbilt, Jr., has secured Walter Luttgren, a veteran of the Long Island classic, to drive his Mercedes. At the wheel of Mr. Graves' Mercedes will be Emile Stricker, who has been a Porthos pilot in the grand prix contests. The Hotchkiss will be guided by H. J. Kilpatrick, who was the driver of the Shepard Hotchkiss when it scored the world's straightaway mile road record at Jamaica last spring.

Willie Haupt, J. B. Ryall, Cyrus Patschke and William Bourque, drivers of no little experience in long-distance road and track contests in this country, will be found respectively in the seats of the Chadwick, Matheson, Acme and Knox cup candidates. The pilotage of the LeBlon Thomas has been entrusted to George Salzman, who has won fame in endurance runs and road record trials, and the fate of the new Hotchkiss racer to Louis Chevrolet, who several years ago scored not a few track records for Major Miller in a Fiat racing car.

HAUPT, CHADWICK

TABLE SHOWING CARS, THEIR MECHANICAL STATISTICS, ENTRANTS

No.	Car	H.P.	Country	Entrant
1	Locomobile	120	America	Locomobile Co.
2	Knox	40	America	Knox Auto Co.
3	Mercedes	120	Germany	Robert Graves
4	Chadwick	90	America	Chadwick Engineering Works
5	Mercedes	120	Germany	W. K. Vanderbilt, Jr.
6	Isotta	60	Italy	Clarence V. Brokaw
7	Matheson	57.7	America	Matheson M. C. Co.
8	Thomas	80	America	E. R. Thomas Co.
9	Hotchkiss	120	France	Hotchkiss Import Co.
10	Brasier	96	France	H. Payne Whitney
11	Acme	60	America	Cordner & Flynn
12	Thomas	115	America	E. R. Thomas Co.
14	B. L. M.	85	America	Thomas Williams
15	Matheson	85.7	America	Matheson M. C. Co.
16	Locomobile	120	America	Locomobile Co.
17	Renault	115	France	Paul Lacroix
18	Mercedes	120	Germany	Foxhall Keene
19	Thomas	115	America	E. R. Thomas Co.
20	Knox	40	America	Knox Auto Co.

Leon Pouget, Brazier; Howard Gill, Thomas, and Thomas Williams, B. L. M., are practically unknown to road racing, as is also Alfred Denison, who has been substituted for Charles Basle as the pilot of the big Knox. Though Jim Florida has been driving the second Locomobile in practice up to today, no final decision has been reached as to the pilot of this car. At the same period there was some doubt as to whether the grand prix Thomas would be able to meet the weight restrictions of the contest and its prospective driver had not even been named.

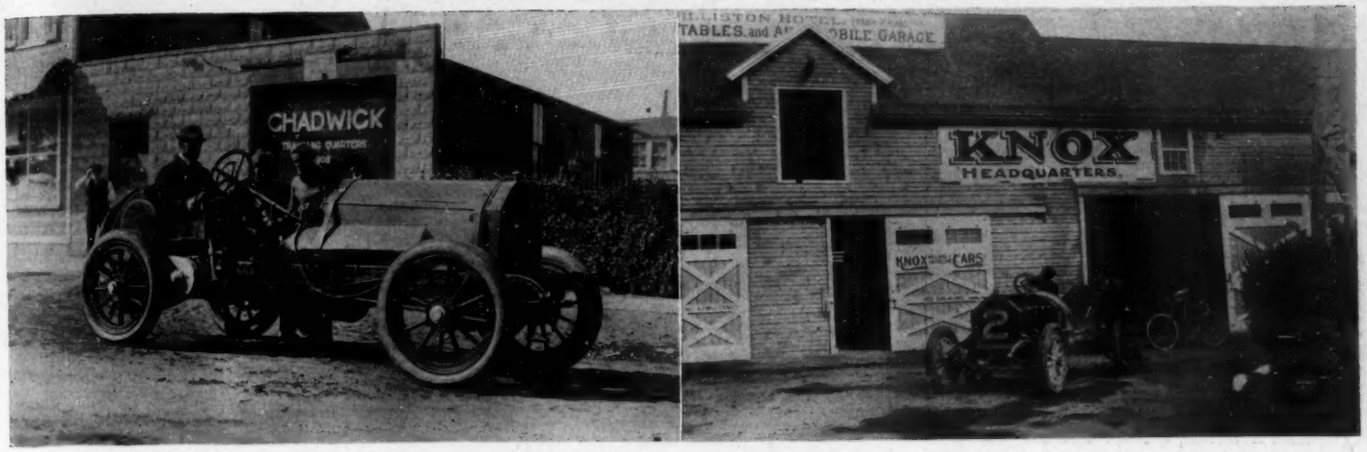
The first Vanderbilt cup race was run in 1904. It was run with controls. Its net distance was 284.4 miles. The race resulted in a memorable duel between George Heath, Panhard, and Albert Clement, Clement-Bayard, the former winning by a narrow margin in 5:26:45 net, an average of 52.2 miles per hour. His fastest lap averaged 67.2 miles. The fastest round of the race showed an average of 70.8 miles per hour, which was scored by Teste in a Panhard.

Controls were abolished the next year, the course being 283 miles. Hemery in a Darracq evolved as the winner in 4:36:08. George Heath, again piloting a Panhard, was second. Joseph Tracy in a Locomobile was third, being the first American combination of car and driver to officially finish in an international road race. Hemery averaged 61.49 for the race and 68.42 for his fastest lap. Lancia, Fiat, however, scored the swiftest round with an average of 72.88 miles per hour.

The third race for the cup took place in 1906 over a 297-mile course and resulted in another victory for the Darracq, Wagner winning in 4:50:10, with an average of 61.43 for the race, and 65.11 for his fastest lap. The best round in the race, however, was scored by Joe Tracy in a Locomobile, at an average rate of 67.66 miles per hour.

The crowd at the 1906 event was enormous and almost uncontrollable. But one fatality to spectators, however, resulted, though there were several onlookers injured. The result was that the A. A. A. racing board voted not to hold any further

ROBERTS, THOMAS FLYER



TRAINING CAMPS OF THE CHADWICK AND KNOX ON LONG ISLAND

AND DRIVERS THAT WILL CONTEST IN VANDERBILT CUP RACE

Driver	Cyls.	Bore	Stroke	Clutch	Wheelbase	Tires
Florida	4	7.25	6.25	Cone	110	Diamond
Denison	4	5.50	5.50	Three-plate	106	Fisk
Stricker	4	6.68	5.9	Lindsay	107	Michelin
Haupt	6	5	6		112	Michelin
Luttgen	4	6.68	5.9	Lindsay	107	Michelin
Lytle	4	5.7	4.72	Multi-disk	118	Michelin
Ryall	4	6	6	Multi-disk	117	Diamond
	4	6	5.7	Three-plate	112	
Kilpatrick	4	7	6.28	Cone	104	Michelin
Pouget	4	6.39	5.5	Cone	104	Michelin
Patschke	6	4.99	5.5	Cone, cork inserts	108	Diamond
Salzman	4	6.875	5.5	Three-plate	104	Michelin
Williams	4	6	6	Helical band	86	Michelin
Chevrolet	4	7.25	6	Multi-disk	117	Michelin
Robertson	4	7.25	6.25	Cone	110	Michelin
Strang	4	6.25	6	Int. Expand	112	Michelin
Keene	4	6.68	5.9	Lindsay	107	Michelin
Gill	4	6.875	5.5	Three-plate	104	Michelin
Bourque	4	4.875	4.75	Three-plate	102	Fisk

contest for the cup until it could be adequately guarded by militia as well as police, or to be run over a protected course. The wisdom of the A. A. A.'s policy in this particular has been very generally recognized, so that at practically all of the big road races and even at hill-climbs the promoters have succeeded in providing militia to guard the course.

The A. A. A. in 1907 failed to secure legislative action or the sanction of the governor to use state troops and the race was not run. It is interesting to note that those who howled the loudest at the postponement have been foremost in casting obstacles in the way of the present contest being run. The building of the motor parkway, however, solved the problem for this year. Although but a portion of it has been completed, it is over that section of the course that the chief danger would arise and that is protected from end to end by a high wire fence. The militia protection will be afforded by Thomas Francis Meahers' Irish Brigade, a corps made up largely of veterans, who saw service in the Spanish war and had its first service in the war of the secession. In its ranks are many trained athletes. They will co-operate with the Pinkerton men and Nassau county deputies, the soldiers being detailed more particularly at turns and in places where the greatest crowds are sure to congregate.

DENISON, KNOX

That 9 miles of cement parkway will be included in the 23.456 miles circuit, over which this year's Vanderbilt cup race will be run, marks a new era in motor road racing, the entire fulfillment of which will come with the completion of the entire 60-mile stretch of the Long Island motor parkway next season. The great American classic next year will be run over a speedway exclusively constructed for motor traffic without speed limitations.

Almost since the birth of the motor car there has been a dream of such a motor roadway. For nearly a decade there had appeared in print "fairy" tales of the projected building of such a great speedway at the gates of the metropolis. It was for the American Automobile Association, however, to take the initiative step toward the realization of this dream. On October 6, 2 days before the last Vanderbilt cup race, the directors of the national body passed resolutions directing the president of the association to appoint a committee of three to consider various propositions to conduct motor races on especially reserved rights of way, and, in view of the possibility of conducting the eliminating race for 1907, to instruct the committee to at once carefully consider such propositions as may be submitted before referring them to the full board of directors of the association.

William K. Vanderbilt, Jr., Jefferson de Mont Thompson and A. R. Pardington, the committee appointed by President Hotchkiss, considered propositions made for speedways in the states of New York, New Jersey and Connecticut. The committee did not let grass grow under their feet, for on October 18 there was a conference of wealthy Long Island property holders at the Lawyers' Club, the outcome of which was the parkway proposition. Assurances of financial support came so promptly, not only from Long Island but from motor car makers as well, that on December 18, 1906, the Long Island Motor Parkway was incorporated with a capital of $2,500,000. How the work was accomplished is history now.

PATSCHKE, ACME

MAXWELL A STAR IN CLEVELAND CONTEST

RESULTS OF CLEVELAND TEST

Car	H. P.	Driver	Score
Maxwell	28	Bleasdale	1000
Thomas	40	Sperry	1000
Garford	30	Ernest	1000
Franklin	28	Carris	1000
*Garford	30	Wedler	946
Stoddard-Dayton	45	Moore	922
Chalmers-Detroit	30	Stickney	791
Chalmers-Detroit	40	Emerson	Out
Jackson	40	Johnson	Out

*Amateur entry.

STEARNS CAR CARRYING SPEAKERS AND OFFICIALS

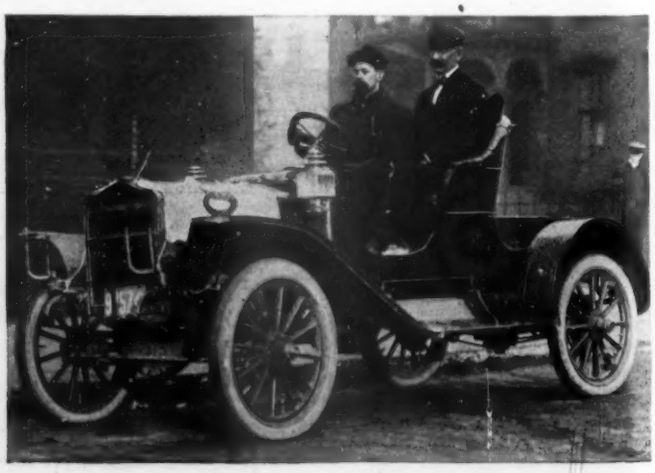
CLEVELAND, O., October 18—One perfect score under a strict interpretation of the rules—three additional cars given clean slates by the committee in charge of the run because of a misunderstanding at the time of entering, due to the officers of the local club—that, in brief, is the summary of the 470-mile 3-day endurance run held here last week in which nine cars started. The final ruling of the chairman of the contest committee, W. F. Bonnell, gives the Maxwell, Franklin, Thomas six and Garford clean scores, while had the rules been enforced in every way the Maxwell alone would have had a perfect record.

A day or so before the start, finding that the entry list was small, a number of additional entries were secured, one of which, the Garford, was entered late the afternoon before the start. A. R. Davis, secretary of the Garford company, was given to understand that, as his car was taken off the floor, was brand-new and admittedly not in good condition for such a contest and had no time for preparation, it would not be compelled to take the brake test. This was unknown to those directly in charge of the contest until the final day, when the cars were being tested at the finish. At first the Garford driver, E. E. Ernest, refused to take the brake test, but later did so under orders from Mr. Davis, who stated that he would not protest, but that he had been told the brake test would in no wise affect his perfect score. Upon careful investigation, and after a recommendation from D. Beecroft, the chairman ruled that under the circumstances the brake test would not count. This gave both the Garford and Thomas perfect scores, the Garford foot brake being bad, while the Thomas hand brake was a trifle off color.

The Franklin was at first penalized for using extra oil, due to going off the course by following the confetti when it led off the wrong way. This penalty would have stood but for the fact that a number of observers failed to report other violations of this rule. The committee was in a quandary, and as the other penalties could not be enforced because of the observers' carelessness, the Franklin was allowed a perfect score. The Maxwell, driven by C. G. Bleasdale, came through as clean as a whistle, not a single thing being reported against it. C. S. Carris handled the Franklin, George Sperry the Thomas and E. E. Ernest the Garford.

The 3 days' run was a very hard one on all the cars, the schedule calling for a straight 20 miles an hour over good and bad roads, with four controls a day, the distance averaging 157 miles each day. As a consequence the second day developed into something very akin to a road race, the cars doing better than 40 miles an hour in many cases. Once they were compelled to go 19 miles in 55 minutes, 7 miles of which led them through the streets of Cleveland at 5 o'clock in the afternoon. Not a single control was missed, however, because of the fast run-

GARFORD TOURING CAR, PERFECT



MAXWELL, BLEASDALE UP, STAR OF THE RUN

GARFORD ROADSTER DRIVEN BY ONLY AMATEUR IN TEST

ning necessary to make this running time. The first day developed but one penalty, the Stoddard-Dayton being forced to stop because of a loose connection in the coil box. After taking on gasoline, Driver Moore could not start his motor, and broke his battery seal to find the cause. The batteries were all in shape, and he broke the bonnet seal to examine the commutator. This was all right, but in the coil box was found a loose screw. These broken seals and the time used cost the Stoddard 53 points. All the other cars came to the finish without a penalty.

The hard second day sent three more cars out of the 1,000-point list—the Franklin, afterward given a clean score; Wedler's Garford, an amateur entry; Stickney's Chalmers-Detroit 30 and the Jackson driven by Johnson. The Franklin's trouble is explained above. Wedler's Garford developed a leaky radiator, which necessitated a broken bonnet seal and two stops for water, penalizing it 14 points, while a bearing on the Jackson cracked, holding it at Youngstown and putting it down and out of the contest.

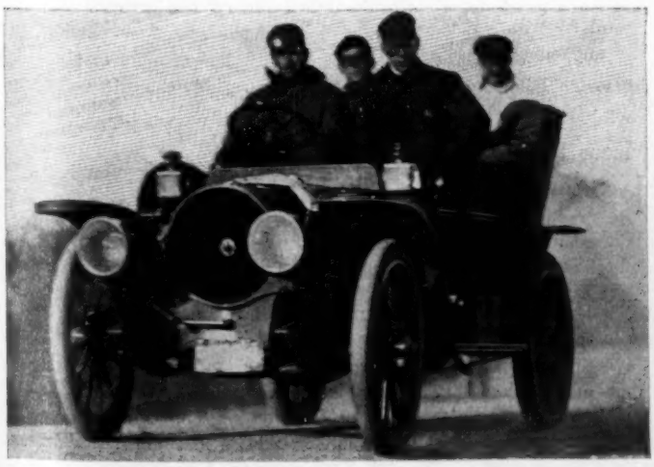
The final day's run sent the Chalmers 40, driven by Emerson, out of the contest, the fan breaking and tearing a hole in the radiator soon after leaving Cleveland in the morning. The Stoddard received another penalty, for the foot accelerator stuck, the floor boards being lifted to loosen it enough to close the throttle.

The final examination was quite a surprise, not one of the machines being found with weakened springs, bent axles, transmission, motor or ignition troubles, although the Garford roadster's front wheels were sprung a trifle.

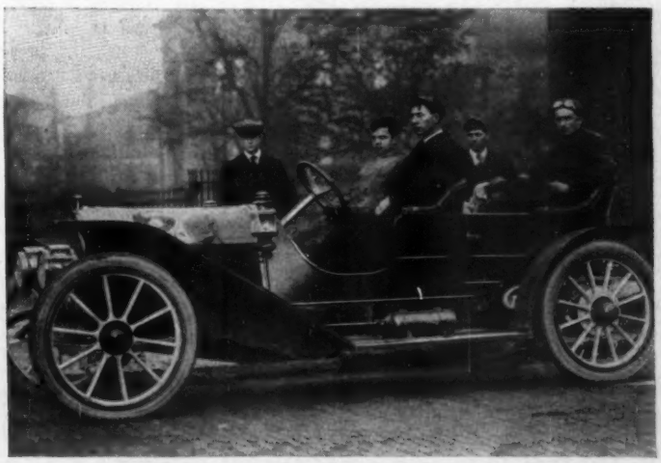
The run was conducted in a rather loose manner, this being the first event of the kind ever presided over by the present local officials. The confetti was carried in the Stoddard-Dayton, a competing car, and in addition to this, the wrong road was taken several times, sending cars many miles out of the way. The first day the cars had 8 miles to make from one of the small controls to Oberlin, and started out at a good clip. After going these 8 miles it was found that they were still 7 miles away, and as a result they commenced to "beat it" and beat it hard, running over 40 miles an hour the remaining distance. Every machine ran in late and found that the confetti car had taken the wrong road. After the mistake had been discovered, it had kept on, the man in charge expecting to have the penalty for lateness remitted. This of course was done, but the engines had received a severe pounding, and the cars had been jarred throughout. Other confetti mistakes almost as bad were made on the second day.

Of secondary importance to the drivers, but of considerable moment to the club officers was the "talking" feature of the trip. Every morning and afternoon short controls were established where the cars waited 10 minutes, while prominent Clevelanders addressed the farmers upon the subject of good roads, the state motor vehicle law prohibiting fast driving, etc.

These short controls had an effect not looked for by the committee. No matter how much a car made up in the run to the first control, it was obliged to lose it while waiting for the schedule to catch up. This had the effect of keeping the cars at a fast pace all the while. The speeches, however, seemed to arouse considerable enthusiasm. Such prominent men as Martin Dodge, formerly head of the good roads bureau at Washington; Harry Vail, ex-county clerk of Cuyahoga county, Ohio, and others took care of the speaking part of the trip.



FRANKLIN WITH CARRIS AT THE WHEEL



THOMAS FLYER THAT MADE A CLEAN SCORE

Published Weekly
The Class Journal Company
1200 Michigan Avenue, Chicago
New York Office, 239 West 39th Street

MOTOR AGE

Subscription Rates
United States and Mexico, per year, $3.00 Other countries including Canada, $5.00

Entered as Second-Class Matter September 19, 1899 at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

Misleading Advertisements Injurious

A FAULT that has attained considerable proportions during the past season is misleading advertising on the part of manufacturers and dealers, in which the performance of cars in various contests is emphasized. A few examples will suffice to illustrate this: In a hill-climb a high-powered car, not regularly entered in the contest, is permitted to make an attempt against time on the hill, and sets a lower mark than the contesting cars; the performance is immediately followed by an advertising campaign, setting forth the car as "making fastest time in ——— hill-climb." As a matter of fact it did not compete in the hill-climb at all, and the advertisement is unfair to the regular contestants. Promoters in charge of such contests should not give permission for such trials for the benefit of non-contestants. Another example: In an endurance run a car making a perfect road score and being penalized in the final outdoor test or in the car inspection is advertised as "Perfect score in ——— run," which should have read, "Perfect road score in ——— run." In every department of contests during the past summer, misleading advertisements of this nature have appeared.

The Cause Is Apparent

IN many cases, where an investigation has followed an advertisement of this nature, the cause has been placed to over-zealous advertising men, who have prepared copy, which has not received the final approval of the maker, or his duly appointed representative. Scarcely is a contest over before the army of advertising solicitors is on hand—many with copy already prepared. Often this copy is hurriedly approved by one of the manufacturer's representatives without due consideration being taken of the exact wording of the advertisement. In other cases, an advertising agency has offended along the same lines, with the result that a dozen mediums have carried the misleading advertisement, and a great injury is already done. A third investigation shows that the company has been malicious and has intentionally distorted the facts as given out. In the fourth case, where the advertisement was prepared at the factory office, the representatives had failed to properly report the outcome.

A Possible Remedy

THERE are two ways to remedy a fault or existing evil: first by precautionary measures; second by a consequent punishment. The former is preferred on all occasions, and the latter only recommended where the precautionary measures fail utterly to have the desired results. The precautionary measure is to have the promoter hand to the contestants and others, before the contest, a printed card containing the regulations relative to misleading advertising, and making only that advertising recognized, which is in strict accordance with the findings of the committee or referee of the contest. If this were done on every occasion, there would be few cases other than intentional ones of misleading advertisements. A second remedy would be the furnishing, by the referee, immediately at the close of the contest, a form showing the exact standing of the different contestants in the contest. It frequently happens that the only way in which the contestants receive knowledge of their final standing is through the trade and daily press. This should be rectified. Should these precautionary methods fail, the only recourse remaining is the disqualifying of the contestant in question, and the preventing of his competing in future contests until such time as there is reasonable assurance that he is ready to abide by the findings of the reference and advertise accordingly.

1909 Car Designs Very Varied

THIS is the expectant season of the year: Every factory is wondering what every other factory has ready to offer in the way of car design and improvements for next year. Some of the "early birds" made their announcements two months ago; others are making them week by week, but there remains the major quantity of makers who have yet to make known to the public what they expect to market during the approaching season. A visit through a majority of the factories has enabled Motor Age to gauge with a fair degree of accuracy what are to be the cardinal features in the new models. Paramount in this category comes the small car; makers who heretofore have boasted of only one model, and that a high-powered one, have ready a small four-cylinder type with wheelbase not more than 110 inches and motor with cylinder bore from 3½ to 4½ inches. In half a dozen cases at least the four-cylinders are formed in one casting, **en cloc**, as the Frenchman would put it.

Unit Construction Popular

MAKERS are coming to the conclusion that the gearbox must be either incorporated with the crankcase or with the rear axle. Many manufacturers have found it difficult to maintain alignment from the motor, through the transmission back to the rear axle, in which three units must be maintained in alignment by the framework of the chassis. In small cars, the transmission on the rear axle is very popular, and the coming shows will see a score of these on exhibition. In medium-powered machines, the combined crankcase and gearbox is preferred by not a few makers. In either case, the alignment proposition is vastly simplified, in fact, almost eliminated.

Rear Axle Changes

IN every factory, with a few exceptions, the rear axle has been a source of study on the part of engineers and factory superintendents. The floating construction is the accepted type, but the manner of manufacturing the housing a debatable proposition. The tendency with a few is to use a one-piece steel casting, forming both axle sleeves, with a central expansion for the differential, and having the axle sleeves gradually tapered from the spring seating to where the differential casing begins, with the thickness reduced as the diameter increases. Other makers are content with a two-piece rear axle housing, in the form of two funnel pieces, the large ends forming the differential compartment. In this style, as well as in the one-piece casting, the truss-rod is eliminated. A third axle that is coming to the front is the de Dion type, in which a drop forging is used in conjunction with a casting portion for the differential.

Motor Parts Cared For

IN all probability, magnetos will be universal, even the low-priced cars being fitted with such. The inductor type of magneto which has a soft iron motor instead of a shuttle type magneto, is being used by many medium-priced makers. In high-powered cars, the high-tension magneto receives the greatest support. Make-and-break ignition will remain practically where it is this year; but the new make-and-break magnetic plug will have a considerable following before the end of the season. This type of ignition is very simple, and, while giving a make-and-break spark, permits of a much simpler motor casting. The incorporating of lubricating means within the engine is on the increase, and the old style of mechanical oiler on the dash will, in 1909, be but a relic of what it once was.

OSTEND ROAD RACING RULES ARE AMENDED

PARIS, Oct. 20—Special cablegram—France gained its point regarding the weight of racing cars in future international road events at the meeting today of the international committee of the Association of Recognized Automobile Clubs, but was forced to compromise on the cylinder bore. The session today amended the Ostend rules by deciding that hereafter the minimum weight of racing cars shall be 900 kilograms, or 1,984 pounds, while the maximum cylinder bore shall be 130 millimeters, or 5.118 inches. The old rules provided that the minimum weight should be 1,100 kilos and the maximum bore 140 millimeters, or 5.51 inches. France wanted the bore fixed with a 5½-inch limit and so recommended to the meeting, which, however, did not coincide with the views of the Parisians.

Paris, Oct. 12—France wants a maximum bore of 140 millimeters—5.51 inches—for a four-cylinder engine, and a minimum weight of 1,984 pounds as the essential conditions of the 1909 grand prix and of all international races held throughout the world. It was a foregone conclusion that the 155-millimeter rule and 1,100 kilos minimum weight would be abandoned after this year, for the 1908 season has proved that cars are too fast for tires to stand the strain. The sporting commission's recommendations will be submitted to the international conference of recognized clubs, to be held in Paris October 20, and will doubtless come in for severe criticism, Germany, Italy and England being in favor of a reduction to 130 or even 120 millimeters for four-cylinder engines. As the French delegates have instructions to hold out for the 5½-inch limit, the fight is likely to be a keen one. The argument of the other members of the congress is that with 140 millimeters and the reduced weight cars will be as fast as this year, and that there will be a constant danger of the tire element falsifying the mechanical results.

When the present rule was formulated at Ostend, Germany was in favor of 135 millimeters, while France held out for 160. In a spirit of compromise France came down to 155, the belief then being that the reduction would produce a car slightly slower than the square motors of 170 and 180 millimeters bore, and, as Henry Brasier expressed it, "it would be valuable to slightly reduce the bore each year and still maintain the same average speed." The possibilities of long-stroke engines were not sufficiently realized by the experts, as is proved by the fact that contrary to general expectations, more power was obtained with the restricted bores than with the unlimited engines. With a bore of 130 millimeters an average long-distance speed of nearly 70 miles an hour is possible on a good course, and at such a rate of travel tires are working near their limits of resistance.

A VANDERBILT TROPHY

Silver trophy offered by Standard Roller Bearing Co. to driver of winning car in the Vanderbilt cup race, providing this car is equipped with Standard bearings, together with cash prize of $500 to driver and mechanician.

Fuel Test for Taxicabs

Paris, Oct. 12—Gasoline is not the only fuel on which motor cars can be run economically, as is proved by the taxicab and delivery vehicle competition which has just taken place in the neighborhood of Paris. The competitors were given a difficult course in the vicinity of the capital to be covered each day, giving a daily distance of 76 miles. Sixty per cent of the course was over rough paving stones, such as the environs of Paris alone can provide; 30 per cent was over bad macadam; the rest of the course was good going. Hills, with a maximum grade of 12 per cent, tested the climbing abilities.

Gasoline, white spirit, carburated alcohol, benzol and any fuel the competitors desired had to be used on 5 successive days. Before each fuel test the vehicles went over the course with the fuel they were to use on the following days, but without any other control than that of a time schedule. This allowed them to make the necessary adjustments and tune up the carbureter for the fuel test, all the work being done by the driver only, no mechanics being allowed on the cars.

The annexed table tells the story of the competition, the chief feature of which was the good results obtained on various fuels and the small amount of fuel used. There were no mechanical defects except on a Cottereau, which overheated, was supplied too suddenly with cold water and cracked a waterjacket. The vehicles engaged consisted of a couple of single-cylinder de Dions of 100 by 120 bore and stroke, one having an hotel omnibus body and the other a closed delivery van, both loaded with sacks of sand; Unic had a four-cylinder 12-horsepower hotel bus and a similar chassis with a delivery body; Cottereau had a four-cylinder cab, 85 by 105 bore and stroke, and a three-cylinder engine which failed to finish; Vinot had an 80 by 110 four-cylinder taxicab; Bayard-Clement had a couple of two-cylinder chassis, 85 by 110 bore and stroke developing 10 horsepower, the one carrying a taxicab body, the other a closed delivery van. In each case the full load was carried in the shape of ballast, and interior dimensions were demanded for all the delivery vehicles. The following table shows the comparative consumptions with the four different fuels employed.

With one exception the carbureters were not altered for the tests with different fuels, the drivers merely changing the floats and in some cases putting in different nozzles. There was considerable difficulty in starting up cold on alcohol, but once going the engines ran well and seemed to develop as much power as with the other fuels. The slight difference in time at the various controls shows that the engines were not disadvantaged by the frequent charges of fuel. Final awards will be made on a price basis only, the car in each class having the lowest expenditure for fuel being the winner. Owing to the small number of entries in the various classes the competitors are grouped in the accompanying table.

RECORDS MADE BY FRENCH TAXICABS IN FUEL ECONOMY TEST

Vehicle	Cylinders	Bore and stroke	H. P.	Total weight, pounds	Fuel Consumed, 76 Miles: Gasoline, 680 deg. gallons	White spirit, gallons	Alcohol 50 per cent gallons	Benzol, gallons
1—De Dion-Bouton bus	1	100x120	8-9	4890	3.04	2.63	3.30	2.60
2—Unic bus	4	75x110	12-14	4386	2.53	2.48	2.92	2.17
3—Cottereau taxicab	4	85x105	16	3538	3.62	3.16	3.47	3.22
4—Vinot-Deguingand taxicab.	4	80x110	12-16	3119	2.56	2.62	2.89	2.20
5—Unic taxicab	4	75x110	12-14	2976	2.29	2.17	3.01	1.84
6—Bayard-Clement taxicab...	2	85x120	10	2436	2.05	1.79	2.17	1.55
7—Demeester delivery van...	4	72x80	10	2050	2.99	2.18	2.43	1.70
10—Unic delivery van.....	4	75x110	12-14	4250	2.40	2.39	2.69	2.03
11—De Dion-Bouton del. van..	1	100x120	8-9	5522	4.04	3.62	3.60	2.86
12—Cottereau delivery van....	3	85x105	10	4772	5.87	*		
13—Bayard-Clement del. van..	2	85x120	10	3042	1.95	1.98	2.21	1.81

*Retired.

NEW IDEA IN MATCHES

Chicago Athletic Association Beats Chicago Automobile Club in Reliability Contest

Chicago, Oct. 16—Chicago's record for originality in the promotion of motoring events was fully sustained yesterday when the Chicago Athletic Association and the Chicago Automobile Club took part in the first amateur interclub reliability team match ever promoted, it is claimed. True, the present Glidden is somewhat on this order, and while the clubs supposedly battle for the big trophy, yet in reality it is a struggle of tradesmen. Not so was this affair of yesterday, for only owners drove, by which term is meant that no one at all affiliated with the trade was permitted to drive. This brought about a bona fide contest which has done much to make motoring competitions popular among the owners of Chicago.

Chicago now boasts of being first to stage an interclub team match, first to hold a demountable rim test, first to card a tire competition such as took place in the recent 1,000-mile run, and first to have a gasoline economy test that is deserving of the name—the struggle for the Standard Oil Co. trophy last week in which the contesting cars traveled 1,000 miles under actual touring conditions and without any carbureter adjustments designed to hold down the consumption of fuel. All these affairs were run this year. It might be added that Chicago also was first to attempt a 1,000-mile run in 4 days.

This interclub team match, though, stirred the town from the ground up. The leading dealers gladly turned out to act as observers and the whole affair went off with a snap and a bang that aroused general enthusiasm. It had been planned to have ten cars in a team, but this match being a new thing, the Chicago Athletic Association found it hard to get that many cars. Six only came to the tape and as the Chicago Automobile Club had ten members eager to uphold the honor of the club, the Glidden rule was adopted and the automobile club penalized six-tenths of a point as against a full point for the cherry circle organization.

Results gave the victory to the Chicago Athletic Association, its team of six incurring only 4 points penalization as against 732 for the automobile club. The latter lost out through accidents early in the fight. The match was over the Elgin-Aurora circuit, but before the two teams got out of town W. A. Egermann in a Rambler was put out by a broken axle and a little later T. P. Henderson in a Studebaker skidded on Milwaukee avenue and broke a wheel. Egermann telephoned for another car and made the circuit, while Henderson secured a new wheel and also caught up with the procession. The others went along with only minor mishaps, the most serious of which were a vibrator adjustment, taking on water and motor stops.

The rules were easy, calling for the contestants to make a non-motor stop run, with penalties for taking on fuel or water and for repairs or adjustments. The running time averaged up about 15 miles an hour and no one was late at controls. Owners had to drive. The report of the judges was as follows:

CHICAGO ATHLETIC CLUB

Entrant and car	Score
S. W. Ham, Locomobile	Perfect
C. T. Knisely, Premier	Perfect
C. C. Ireland, Stevens-Duryea	Perfect
W. K. Cochrane, Stoddard-Dayton	Perfect
F. W. Wentworth, Rambler	1 point
W. K. Young, Thomas	3 points
Total	4 points

CHICAGO AUTOMOBILE CLUB

Bert E. Nash, White	Perfect
F. W. Gethro, Stevens-Duryea	Perfect
R. Tarrant, Jr., Stoddard-Dayton	Perfect
N. H. Van Sickden, Apperson	Perfect
Carroll Shaffer, Stevens-Duryea	Perfect
R. H. Purdy, White	Perfect
J. H. O'Hare, Thomas	1.8 points
C. E. Gregory, Thomas Forty	15 points
T. P. Henderson, Studebaker	115.2 points
W. A. Egermann, Rambler	600 points
Total	732 points

OPPORTUNITIES IN CHINA

Washington, D. C., October 16—Some timely information about the motor car situation in Shanghai, China, has just been received here which doubtless will interest manufacturers who are bidding for foreign trade. Shanghai has a Chinese population of 500,000, many of whom are persons of rank and wealth, and a foreign population of 15,000, a large portion of which is well to do. The first motor car made its appearance there in 1902, and was of American make. After 6 years there are but 140 cars in Shanghai, and only five of them are owned by natives. Although the demand for motor cars is not large at present the market should not be overlooked. Manufacturers of other countries consider it advisable to secure a footing, and if the makers of American cars will extend to their agents the liberal terms granted by the Europeans, confine their transactions to their representatives, and give them a car to sell that meets as nearly as possible the needs of that community, there is no reason why a large share of the trade should not go to American manufacturers. The best method to be pursued by firms who desire to enter the Chinese market is to select a local agent and deal through him with every prospective customer. Local dealers complain that one of the greatest obstacles to an increase of the motor car trade is the practice of manufacturers quoting to individuals the same terms and prices they quote to their regularly appointed agents, for which reason the sale of American cars is not pushed more vigorously in Shanghai. If possible an American representative should be secured; if this cannot be arranged then a firm of a non-competitive nation. In a new field the wares of one country placed in the hands of an alien agent are apt to be held back to the advantage of products of his own country.

IS HE NATURAL HEIR?

Assertion Is Made that Carriage Dealer Is Logical Choice as Ideal Motor Car Agent

New York, Oct. 19—This is the time of the year when the carriage trade is holding its annual shows and manufacturers of motor cars and accessories are grabbing at the opportunity to show their wares to the carriage men, with the idea of interesting them in this newer business. The fifteenth annual exposition of the National Carriage Dealers' Association, held in this city recently, emphasized this point, for twenty-four of the exhibitors were motor car people. The display made by them aroused favorable comment on all sides, and at the finish of the affair led to the following remarks by Herbert Longendyke, general manager of the exposition:

"The carriage dealer is a man of keen discernment and he realizes as well as anyone else that the motor car as a vehicle of utility is here to stay. He is aware, too, that he is in a better position to handle it successfully than anyone else. His trade connections are sound and the experience, born of years of business activity in the same locality, gives him entree into the most desired circles. Indeed, logically considered, the carriage dealer is the natural heir to the motor car trade. Carriage manufacturers all over the country are in sympathy with the movement of aiding the carriage dealer to secure his share of profit out of the motor car business. The two interests are becoming so interwoven that the dealer who does not see the handwriting on the wall and take advantage of its meaning will find his income decreasing.

"Now this does not mean, mark you, that the carriage industry is to fall away. Not at all. It simply means that the carriage dealer should benefit by every innovation that is introduced in pleasure vehicles, be they horse-drawn or otherwise. His especial care has been to cater to a trade that demanded the latest departures in pleasure vehicles, a trade, it might be stated, which has readily taken to the motor car. Surely no one is going to gainsay him if he embarks in the business of merchandizing motor cars. At it is, many of the prominent carriage manufacturers of the country are building or are planning to build motor buggies in large quantities. The tendency to engage in the motor buggy trade was marked at the exposition.

"The exhibition, while it showed the advent of the motor car into the carriage trade, was, from a carriage standpoint, the best carriage exposition ever held. More orders were taken for carriage, harness, and other accessories than ever before, and a larger attendance of the solid, substantial carriage men or the country was evident. It might be well to say that these exhibitions are arranged solely on

business lines and are devoid of music, decorations and everything else that would have a tendency to detract attention from the exhibits on the floor. They are planned for the trade only and, therefore, no attention is given to the entertainment of the public. In no line of trade in the United States is so important an exposition given. The exhibitors at this last show, representing an approximate capitalization of something like $50,000,000, constitute a strong and representative gathering of business men.''

QUAKERS SATISFIED WITH RACE

Philadelphia, Pa., Oct. 19—Since the phenomenal success scored by the Quaker City Motor Club with its 200-mile founder's week race, little else has been talked of here. Some of the more enthusiastic of the Quakers are even talking of putting on a 24-hour race in November, but there is a division of sentiment over this scheme, and it will likely be abandoned for the reasons that November weather is not suitable for an all-night grind and that a profitable gate is improbable. The city fathers are so enamored of the thrilling wind-up the Q. C. M. C. furnished them for the founder's week program that when sounded on a proposition to make such a race an annual fixture in Fairmount park every man Jack of them acquiesced and said it would be a good thing to advertise the city. Last Wednesday a committee of inspection from the Fairmount park commission went over the course and found that in 2 working days it had been restored to its former condition; in fact, it was in better shape, for while many other of the park roads were inordinately dusty as a result of the dry weather, those roads forming the 7.8-mile course were clean and smooth. The $2,500 bond put up by the club to guarantee repairs will be returned less than $500 shy.

BRAZIER CUP CONTEST NEXT

Philadelphia, Pa., Oct. 19—The seventh annual Brazier cup contest of the Automobile Club of Philadelphia will be held Saturday, October 31, over a roundabout course of about 65 miles—via Lansdowne, Alden and Swarthmore to Media, via Newton Square and Devon to Valley Forge; thence through Bridgeport, Norristown, Center Square, Ambler and Chestnut Hill to the Racquet Club in this city. The object of the run will be to keep as closely as possible to the legal speed limit, and the committee in charge already has gone over the ground and decided on a secret minimum, the car coming closest thereto being awarded the cup. The number and variations in the speed limits of townships, villages, cities and open country make the computation quite intricate. Intermediate controls and checking stations will be established, and failure to arrive at either at the time calculated by the committee will mean additional penalties.

WHITE SETS FAST PACE

Steamer Clips Off 5 miles in Track Record Time at Kansas City Automobile Club's Meet

Kansas City, Mo., Oct. 19—So long was the card at the races promoted at the Elm Ridge mile track last Saturday by the Automobile Club of Kansas City that one of the events had to be carried over until afternoon. This was the free-for-all, in which the White Flyer set new Elm Ridge marks up to 5 miles, the time by miles being: 1:03⅖; :58⅕; :56⅖; :57; :57. Darkness had prevented the finishing of the event Saturday.

The races were faster than anything pulled off here in the past and two accidents miraculously resulted in only slight injuries. Before the races Saturday, Fred Dundee and his White went through the outside fence at the north turn of the track, somersaulting down an embankment for 20 feet. Seyfried escaped with a broken nose. His car had skidded on the mud, for the track was sprinkled only 15 minutes before the cars were allowed on the track to warm up. In the 10-mile challenge race, Guy Morgan and his Welch, in trying to take the pole from the Chalmers-Detroit Bluebird, tore down a section of the inside rail with the left front wheel, while the step on the right side of the car damaged a rear wheel on the Bluebird. No one was injured.

The prettiest event was the obstacle race for electrics. Owing to an error in scoring, the proper result was not announced on Saturday. It was Monday before the discovery was made that Mrs. F. E. Gloyd's Woods and Mrs. J. H. Wittman's Pope-Waverley were tied for first place. The prize is a $150 hat and the committee in charge of the meet is in doubt whether to cut the hat into two pieces or to give two $75 hats. Inasmuch as about 7,000 persons attended the races, the club may stretch itself to two hats or the original price. The obstacles in the race were barrels.

Kansas City had its first chance to see demountable rims in action at a race meet. The tire camps were in the paddock and hence not in view of the grand stand. The White entries were fitted with Fisk demountables, and a complete change of rims was made in 3 minutes ⅖ second. This was in the 50-mile race, which at first had been announced as an event for equipped cars, but on which the restrictions were later removed. For two-thirds of the race the Locomobile gained steadily on the field, its nearest competitor, the Buick of Robert Burman being its closest contender. The Locomobile, however, was forced to make a stop to replace a tire. The mechanics did a slow job and when the Locomobile again got under way it had lost so much time that the best it could do was to finish 7 seconds behind the winner, which covered the course in 59:59. In other events the interest was slack, except in the 10-mile match race. This event grew out of a challenge by J. P. Cudahy to the owners of fast cars in Kansas City. He was taken up by Frank Dean's Packard and James B. Porter's Bluebird. The Packard led to the end of the second mile, when it picked up a nail and dropped to third, the cars finishing in this order: Bluebird, Welch, Packard. Chancey drove 8 miles on a flat tire, a difficult task when it is considered that the time for the event was 11:22⅘ and that he finished less than ⅛ mile behind the winner. Summaries:

SATURDAY'S RESULTS

50-mile endurance for all stock cars with no restrictions — Buick, 40 horsepower; Robert Burman, driver, won; time, 59:59. Locomobile, 40 horsepower, Fred Leiser, driver, second; time, 1:00:06. Buick, 40 horsepower; Brown, driver, third; time, 1:00:16.

½-mile obstacle race for electric cars driven by women—Mrs. J. H. Wittman, Pope-Waverley, and Mrs. F. E. Gloyd, Woods, tied for first place with a score of 975 out of a possible 1,000. Mrs. Gloyd's time was 3:08 and Mrs. Wittman's 3:08⅕. Rauch & Lang, driven by Miss Gail Cherry, time, 3:10, third; score, 950. Columbus, driven by Miss Mary Holmes; time, 3:25, fourth; score, 925.

10-mile race for Board of Trade cup for stock cars and with no restrictions—White, 30 horsepower; Gus Seyfried, driver, won; time, 10:47. Stoddard-Dayton, 40-45 horsepower; George Wansch, driver, second; time, 10:58. Studebaker, 30 horsepower; William Goodrich, driver, third; time, 11:31.

Special 10-mile broad challenge race issued by J. P. Cudahy, with no restrictions — Chalmers-Detroit, 40 horsepower; Karl Schnorr, driver, won; time, 11:22 4-5. Welch, 50 horsepower; Guy W. Morgan, driver, second. Packard, 30 horsepower; John Chancey, driver, third.

5-mile race for runabouts or touring cars for cars costing from $2,000 to $4,500—Welch, 50 horsepower; Guy W. Morgan, driver, won; time, 6:20⅗. But one car finished.

5-mile race for stock touring cars or runabouts for cars costing $2,000 or under—Maxwell, 20 horsepower; Charles Levendoske, driver, won; time, 7:24. Cadillac, 30 horsepower, R. C. Greenlease, driver, second; time, 7:28. Buick, 18 horsepower; Robert Burman, driver, third; time, 8:08 3-5.

5-mile motor cycle race free for all—Indian, driven by Kenneth Norton, won; time, 6:08. Indian, driven by Forest M. Jones, second. Indian, driven by Cary C. Halm, third.

Special speed test—Stanley Kellogg, of Bridgeport, Conn., did 5 miles in 4:59. His best mile was done in 59 seconds.

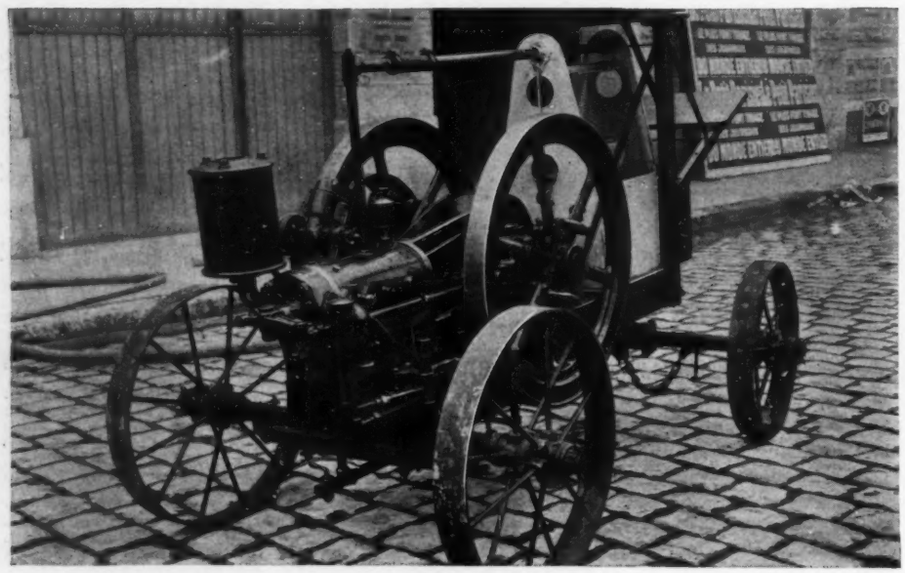
MONDAY'S RESULTS

Five-mile free-for-all—Ralph Baker, 20 horsepower White Flyer, won; Gus Seyfried, 30 horsepower White stock car, second; Robert Burman, Buick, third; Victor Snyder, Pilain, fourth. Time, 4:52. The fastest mile was in :56 2-5, breaking the track record by more than 5 seconds.

SPEEDWAY FOR PROVIDENCE

Providence, R. I., Oct. 18—If plans which are now under consideration are brought to an ultimate conclusion it will mean the complete transformation of the famous and historic old Narragansett park racetrack into a course for the use of racing motor cars, with the intention of making it ultimately one of the fastest and greatest speedway courses in the country. President F. E. Perkins of the Park association has had the plans drawn for the work which will mean the end of the old racetrack, which has been idle since poolselling was barred 2 years ago, there having been no more grand circuit meets here since that time.

INTERNATIONAL HARVESTER CO.'S TRACTOR DEMONSTRATING ITS WORTH



C. I. M. A. 4-HORSEPOWER MOTOR PUMP

FRENCH CASTELIN TRACTOR IN ACTION

Farm Tractors

BOURGES, FRANCE, Oct. 10—Central France, the most highly developed agricultural district in the world, has been selected as the spot for the first international agricultural motor exhibition. But though this is a country where the land is made to produce its maximum, it is not one in which mechanical aids to agriculture have been most highly developed. Thus, when the competition for mechanical means of plowing was commenced the three machines which lined up in front of the judges were respectively from Chicago, Bedfordshire, England, and Paris. Though the International Harvester Co.'s machines are household articles in France, the American tractor is a new feature, and as such was watched with considerable interest. The British Ivel machine is one which has made itself known in the colonies and foreign countries during the last 3 or 4 years, and the French Castelin is practically a newcomer.

The method of operation on both the American and British appliance was for the tractor to pass over the ground with a plow in the rear, one man operating the tractor and another looking after the plow. The French machine remained stationary, dragging its plow through the ground by means of a couple of winding drums, a fixed point, a pulley and a steel cable. All three machines were put through practical tests on a large field divided off into equal parts, the award of the judges to be made on the speed with which the work is done, its regularity, and economy of operation. No report has yet been made, but it is evident that the prize distribution will be between the Britisher and the Yankee only.

The International Harvester Co.'s tractor consists of a single-cylinder horizontal engine mounted on a four-wheel carriage. The engine is of the long stroke stationary type, with two huge flywheels, and a modified form of water tank forward, the water on leaving the engine being sprayed through a fine wire gauze screen, then collected in a tank below. The valves are in the head, the exhaust only being mechanically operated, and the engine being controlled by a governor which operates on the exhaust lift.

The Ivel machine is a compact three-wheeler having as its power plant a double opposed engine of 6 by 6 inches bore and stroke. First connection with the transmission gear is a leather-faced cone clutch, the gear being reduced twice before drive is finally taken to the rear axle by a single chain. Though water-cooled, the engine has no radiator, the necessary amount of water being carried in a large tank at the rear of the machine and circulation assured by thermo-syphon. The road wheels are all metallic, the two rear ones taking the drive, and the single front one being steering. When used across country transverse ribs are attached to the face of each

in French Trial

of the rear wheels, being detached when running on macadam roads.

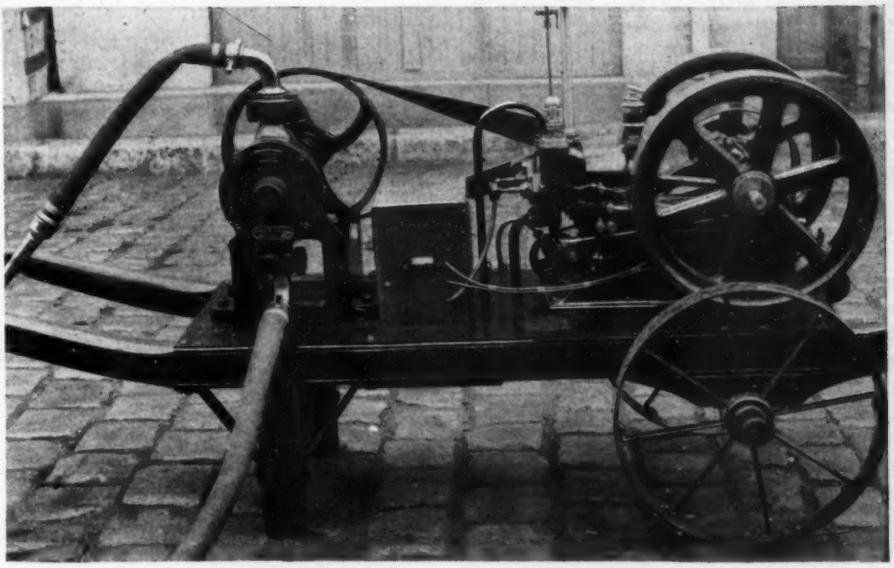
The Castelin tractor has a single-cylinder vertical de Dion motor as its power producer, the bore and stroke being 4 3-10 by 5 1-10 inches. The engine is water-cooled, has automatic inlet, mechanical exhaust, and ignition by storage batteries. Power is transmitted to the front wheels by means of a low reducing gear, a countershaft and side chains. The rear wheels are steering, with control by tiller. For stationary work the drive is taken in a similar manner from a separate countershaft to the drumshaft by means of side chains. When required for plowing, the tractor is immobilized by dropping down a powerful strut and fixing in the ground a couple of posts between which is laid a chain to carry the pulley, around which the cable runs. The practical operation is the simple one of setting the winding drums in operation and drawing the plow through the ground, one man remaining in charge of it, while another occupies himself with the engine.

Although interesting comparisons could be made by watching the three machines at work together in one field, it was impossible to arrive at very definite conclusions without detail figures of cost of operation in each case. The French tractor, having the lowest power, and the lowest initial cost, would at first sight appear to be the most economical; but as the tests showed, on rough ground the cable had difficulty in performing what was accomplished easily by the two hauling tractors.

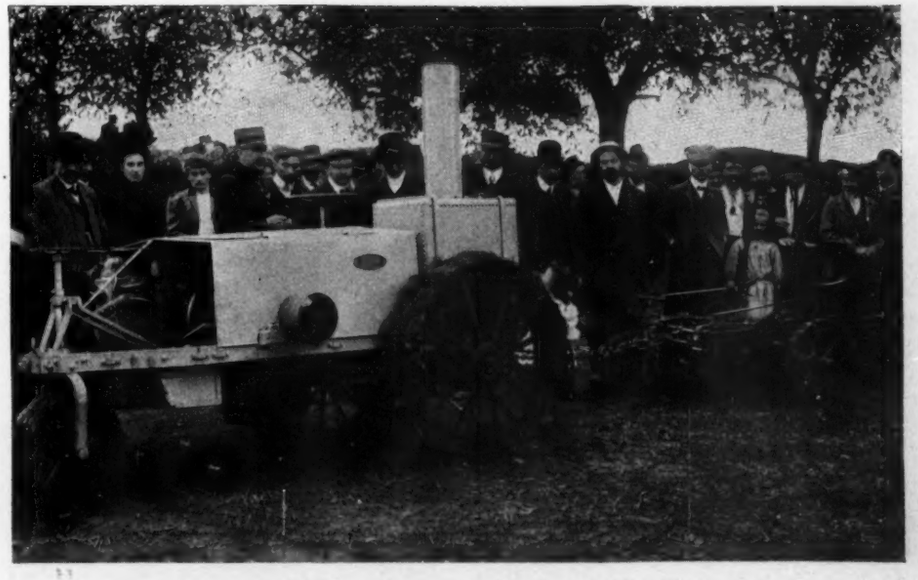
After the plowing tests the tractors were invited to operate a reaper, which task was very successfully accomplished by both the Ivel and the International Harvester machine; the Castelin did not take part in this. Finally by means of belt connection, the three tractors were put to stationary engine work.

The feature of the exhibition, held for 1 week in the town of Bourges, was the number of stationary engines of various types operating threshers, grinding mills, choppers, churns, saws, etc. Single-cylinder machines of both horizontal and vertical type were in the immense majority, and varied in power from 1 to 30 horsepower. Gasoline was practically the only fuel used, the alcohol section which it was expected would be important, failing to attract entries; steam was unrepresented with the exception of one English tractor. Single-cylinder engines, vertical type, with mechanically operated valves and high-tension magneto, mounted on a light carriage with two wheels, were shown in numbers, generally linked up with a water pump, or provided with pulley for belt connection to various machinery. It is in this direction that the greatest opening for the introduction of internal combustion motors to agriculture is likely to be found.

FRONT VIEW OF THE IVEL TRACTOR AT WORK AT BOURGES



GARDENER'S HOSE WORKED BY MOTOR POWER



IVEL TRACTOR READY TO START PLOWING DEMONSTRATION

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems and invites a discussion of pertinent subjects. Correspondence is solicited from subscribers and others.

BETTER INDIANA ROUTE

Kokomo, Ind.—Editor Motor Age—In Motor Age, October 8 issue, page 17, you recommended a route from Chicago to Muncie by way of South Bend, Kokomo and Tipton, which is all right, but by the way of Dolton, Oak Glen, Dyer, St. Johns, Crown Point, Shelby, Thayer, Aix, Rensselaer, Wolcott, Seafield, Reynolds, Monticello, Delphi, Flora and Kokomo, you will save between 15 and 20 miles, and, while having a short stretch of road that is worse than any on the South Bend route, the balance of the road is much better. Between Kokomo and Muncie, go 28 miles east to Jonesboro and there take the old Mississinewa Indian trail—now a fine gravel road—which angles across the country through Matthews and Wheeling to Muncie. This road is a few miles shorter than by the way of Tipton, and between Tipton and Muncie the route is through several towns where the streets are very rough.—George L. Davis.

FIVE CRANKSHAFT BEARINGS

Milwaukee, Wis.—Editor Motor Age—Through the Readers' Clearing House will Motor Age advise me by a diagram, if possible, how a crankshaft turns on five bearings instead of three? Does the length of the crankshaft determine the number of bearings used, or is this a matter of suspension or method of casting, *en bloc*, singly, or in pairs? In a three-point suspension, how is the power plant suspended in the middle of the frame? In a five-point suspension, how is it arranged to have two points flexible as some makers claim?—Subscriber.

One of the accompanying illustrations shows a motor with five crankshaft bearings, designated respectively 1, 2, 3, 4 and 5. The length of the crankshaft is not the determining factor in the number of bearings used; rather, whether the cylinders are cast singly or in pairs is of more consequence in deciding upon the number of bearings carrying the crankshaft. With four cylinders A, B, C, D, cast separately, there is room between each adjacent two for a shaft bearing; whereas, were cylinders A and B formed in one casting so that there would be no open space F between them, there would be little room for the bearing 2. In the same way there would be little room between cylinders C and D for the bearing 4, and, as a result, the crankshaft would be a three-bearing one, using only the bearings 1, 3 and 5. It is becoming common practice in small four-cylinder motors, in which the cylinders are formed in one casting, to use only two bearings, one at each end of the crankcase. On the other hand, there are motors in France and England in which the cylinders are cast in pairs, but with a bearing provided for the crankshaft between the two cylinders constituting the pair. In such cases as this the custom is to employ a ball-bearing, as it occupies little length. In a three-point suspension system it is customary, as shown in the illustrations, to use two methods of support, first, by arms A and B at the front end of the motor, and at the point C on a dropped crosspiece of the frame in the rear. In other cases this style is varied by supporting the crankcase D on a single point E in front, and two points at the rear, by the arms H and K. In this case, the arms H and K rest directly on the side frame pieces, or on brackets attached thereto, and the front end of the motor on a crosspiece of the frame. This type of support, with two arms at the rear, is used on the Knox car, but in which the forward support at E is a trunnion. On the other hand, the Stevens-Duryea cars make use of the two forward arms A and B on the crankcase D, and a central support C beneath the rear of the gearbox C.

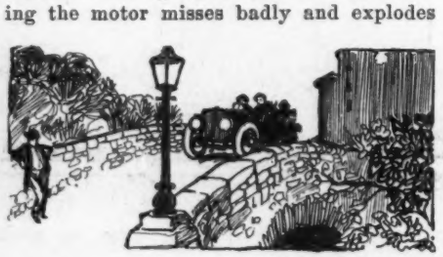
BUILDER OF SELDEN CAR

St. Louis, Mo.—Editor Motor Age—I understand there is a new car on the market called the Selden, made somewhere in the east. Will Motor Age send me one of their catalogs?—E. A. Freund.

The Selden car is manufactured by the Selden Motor Vehicle Co., Rochester, N. Y., and for this season is made in two sizes of touring cars, for five and seven-passenger work respectively. It is a conventional four-cylinder machine with selective transmission, shaft drive. A catalog of the Selden car can be obtained by writing direct to the concern.

TOO WEAK A MIXTURE

Wolcott, N. Y.—Editor Motor Age—Through the Readers' Clearing House will Motor Age inform me what is the trouble with my two-cylinder Queen. The motor runs all right with throttle open or closed when car is standing still or in direct drive either on hills or level road, but when the low speed is used for hill-climbing the motor misses badly and explodes in the carbureter and muffler. I have had the motor dismantled, new valves put in and ground to a seat, also the springs on valves and piston rings looked after. A Holley model W carbureter is employed. The car has been rewired, commutator cleaned, and new joints put in vibrator controller on spark coil. The spark plugs are all right; in fact, everything is apparently all right as far as I can discover. —H. C. Whitford.



The entire trouble is with your mixture, due to not feeding enough gasoline. This may be rectified by adjusting the needle on the carbureter, but should this not suffice it may be necessary to raise the float level in the float chamber, which can be done by adjusting the float on its stem.

USING A DECARBONIZER

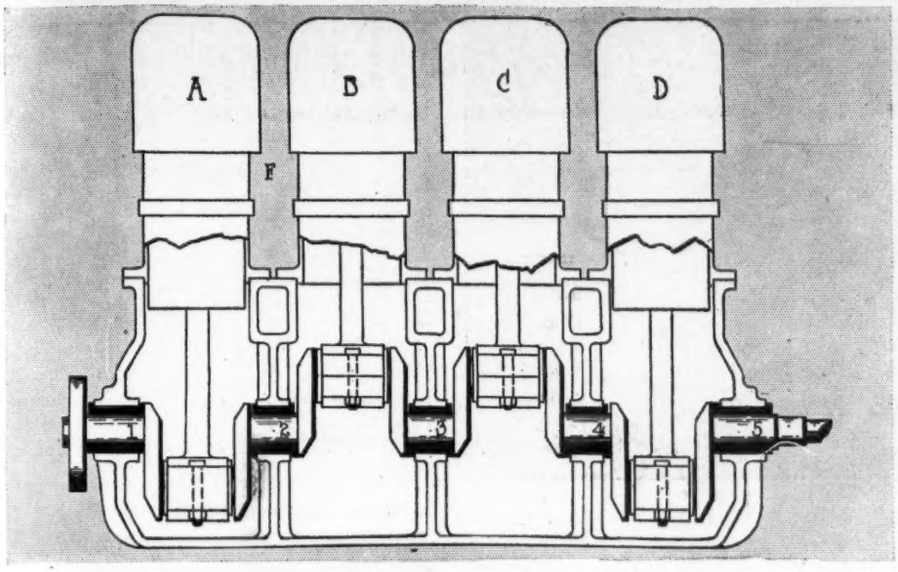
West Liberty, Ia.—Editor Motor Age—Will Motor Age give me the name and address of the firm making the decarbonizing solution used by Palmer J. Kress, reference to which he made in a communication to the Readers' Clearing House October 1, page 19. Does Motor Age consider its continuous use injurious to the engine, as stated by Mr. Kress, namely, ¾ ounce to a gallon of oil? Would it not be better to prevent the formation of carbon than to take it off after it has formed?—Clark Kester.

The best method is undoubtedly to prevent carbonization, which can be done by improving the oiling system and perfecting carbonization. It is not a good policy to use too much decarbonizer. Many demonstrators follow the practice of adding a little each night, while the motor is cool. Motor Age does not know the name of the decarbonizer used by Mr. Kress, but will publish it later.

STOPPAGE IN CIRCULATION

Vinton, Ia.—Editor Motor Age—Through the Readers' Clearing House will Motor Age give me some advice concerning a self-contained cellular radiator which does not circulate. The pump is in good shape, does its work perfectly, but the water will not circulate through the radiator, but goes around it in the tank. The water will be boiling, steaming, and the tank very hot, yet the radiator remains cold, until the machine has stood a few minutes when the radiator warms up a trifle. I have tried every known method of cleaning the radiator out, thinking possibly the trouble might be caused by dirt or scale, but this has not eliminated the difficulty.—L. W. Traer.

It is difficult to say where the stoppage in the water circulation system is, but it looks as though it were in some of the pipes. This stoppage may be discovered



DESIGN OF FIVE-BEARING CRANKSHAFT

by testing as follows: To determine if the radiator is stopped up, fill with water and detach the bottom connection, noting if the water flows out in a stream. If it does, you may rest assured that the radiator itself is all right. Next, disconnect the pump and attach a hose so that the water from the hose will be forced through the cylinder jackets and out through the return pipe. You will be able to determine by the flow from the jackets whether there is a pipe clogged or not. One or two repair men have a practice of coupling a compressed air pipe to the connection and forcing compressed air through the jackets and tubing. This is not so ocular a proof as the water system. Before any of this is done a simple method is to detach the return water pipe to the radiator and run the motor, and should the water flow from the detached pipe it will be sufficient proof that the cylinder jackets and tubing are clear and that the radiator is at fault.

EQUIPPING A GARAGE

Reading, Pa.—Editor Motor Age—As I am planning to build a garage, will Motor Age give me some information, or designs for such?—W. W. Riegel.

Should you contemplate opening a public garage, you are referred to Motor Age issue August 13, page 18, on which information under the head "Equipping a City Garage" is given. Should the information be for a private garage, you are referred to pages 20 and 21 October 15 issue Motor Age. Additional articles on private garages will appear in the columns of Motor Age from week to week.

WANTS 75-POUND MOTOR

Dayton, O.—Editor Motor Age—Will Motor Age tell me where I can obtain a four-cylinder engine, weighing not more than 65 to 75 pounds?—Eugene Fruheberger.

A four-cylinder engine of this weight may be obtained from the C. H. Curtiss Co., Hammondsport, N. Y., and perhaps from other makers of light-weight motors for airship work. Motor Age will appreciate information from readers on this type of motor.

USING A BATTERY RECHARGER

Davenport, Ia.—Editor Motor Age—In Motor Age, issue September 17, page 20, the answer to L. Pfister does not cover the question about the Fisher and the Apple battery chargers. As it is my intention to buy a battery charger of above type, which is claimed to keep the storage battery for ignition always full so that there is no danger of ever being caught with a weak or discharged battery, I would be glad to have Motor Age inform me if a storage battery, kept fully charged by a battery charger driven by the engine of a car, would last as long as one sent to a charging station, when the voltmeter shows the battery to have less voltage than it should carry, which, in my case, is 6 volts?—G. Treimer.

In ignition battery work it is possible to use a Fisher or Apple generator for recharging the battery without injury, providing the current does not exceed a 3-ampere rate. Above this the battery is injured. A direct current only can be used in this work.

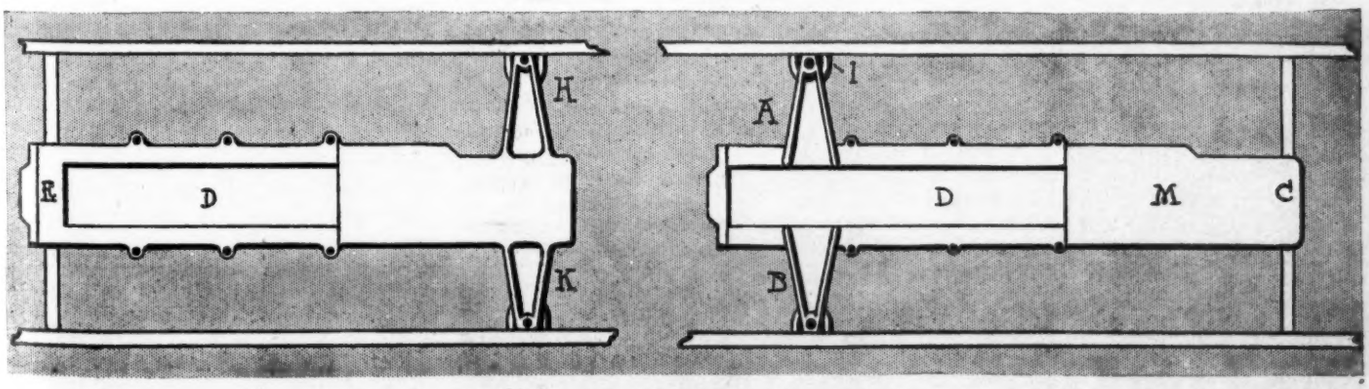
MOTOR TOO SMOKY

Chicago, Ill.—Editor Motor Age—Will Motor Age advise me how to prevent my small air-cooled motor from smoking when not under load and in low gear. The oiling is by splash and is cut down to the limit? Would baffle plates remedy this trouble, and if so, what is the correct position and form of same? Will Motor Age make a cut of one that would be suitable for 3¼-inch cylinder?—Subscriber.

The smoking difficulty in your car, if it is of the vertical cylinder type, can be overcome to quite an extent by placing a baffle plate at the bottom of the cylinder between the cylinder flange and the crankcase. This plate can be made from a circular piece of tin, and with a slot cut in it in which the connecting rod can work; this done, place the plate on the crankcase opening and fit the cylinder on, bolting it in place. Undoubtedly much of the smoke is caused by an excess of oil, which escapes through the exhaust valves and is discharged in the muffler pipes.

POOR CARBURATION AND OILING

La Salle, Ill.—Editor Motor Age—I have a motor car which was partly assembled at Marseilles, Ill., and contains a Brennan two-cylinder engine ignited by a coil made by E. Q. Williams of Syracuse, N. Y. I have been having considerable trouble with it of late and ask Motor Age to assist me in locating it. When the engine is running the front cylinder charge fails to fire every other time, namely there are regularly three explosions and a miss, then three more and a miss. If I hold either vibrator down the other cylinder is



ILLUSTRATING TWO STYLES OF THREE-POINT SUSPENSION FOR UNIT CRANKCASE AND GEARBOX

LUND'S IDEAL CAR FOR NEBRASKA ROADS

fired every time. Occasionally if the engine is running slowly and I apply the slow speed lever, the engine does not miss the first few feet the car moves. Compression is good and equal in both cylinders. Timer is in fine condition. Vibrators do not stick. Changing spark plugs has no effect. I had the car in a garage but the trouble was not located.—E. T. Ebersol.

It looks very much as though the intermittent missing you speak of is caused by faulty carburation, as well as faulty lubrication. Many cases similar to this have been traced directly to excessive carbonization on the interior of the cylinders. Complete readjustment of the carbureter and reducing the lubrication will undoubtedly bring good results. It may be the cylinder has been scored somewhat, which can only be rectified by reboring. The missing might be due to a loose contact in the timer, but this is hardly as probable as the carburation difficulty. The fact that when you hold the vibrator down giving a spark in the other cylinder every time is sufficient proof that your electric system is all right.

ZINC IS THE NEGATIVE

Carleton, Neb.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell me which is the positive and which the negative point on a dry cell, and which point should be grounded on the motor?—F. M. M.

In a dry cell the zinc terminal is the negative and should be grounded.

HARD CRANKING TO START

Milwaukee, Wis.—Editor Motor Age—Will Motor Age tell my why it is that a 50 to 60-horsepower four-cylinder car is so difficult to crank? I have seen drivers labor in turning it over and have been led to believe it is due to a heavy flywheel and high compression. Is this correct? Recently the driving shaft of a six-cylinder car was broken when the driver tried to start the motor from the seat. What was the cause of this?—B. Perrer.

The reason a four-cylinder motor of 60-horsepower is difficult to start may be due to high compression; also too cold cylinders. If it is simply hard to crank, this is directly attributable to the high compression used. The heavy flywheel has nothing to do with making the cranking hard. It frequently happens that motors of this size are hard to start because of the valve timing which makes it difficult to get an explosive charge into the cylinders at the start. This is particularly the case when valves overlap, by which is meant, if the intake and exhaust are open at the same time for a brief period, which occurs when the intake opens before the exhaust closes at the top dead center. It is difficult to state why a motor could break its crankshaft when being started from the seat as you say, unless it were due to a violent backfiring.

DRY CELLS GIVE SHORT MILEAGE

Lamoni, Ia.—Editor Motor Age—I have a runabout, of my own construction: motor, four-cylinder; carriage with Herz timer and Pfanstiehl four-unit dash coil. Everything works fine but the batteries, and they last only 100 to 150 miles. I have storage and dry batteries; and have carefully examined the wiring for short circuiting, but am unable to locate any trouble in the wire, which is Packard cable both primary and secondary. The engine works well—never misses a shot—and I am able to travel all the hills around here on the high gear; but the battery consumption is, in my opinion, abnormal. However, it is my first experience with four cylinders, and I would be pleased to have suggestions from you in regard to the case. I have tried light and heavy adjustment of the coil vibrators, without any apparent change. The coil people claim that I should get 1,500 miles out of a set of six good 20-ampere cells, but I get scarcely 150, and have the switch open going down hill and take only short runs. —G. H. Derry.

The undoubted trouble with your ignition rests in the dry cells. A double set of dry cells used alternately should give you 3 months' service. If you do not alternate them, their recuperation period will be interefered with and you will not get the same amount of service out of them. It may be your coil is consuming too much current, which is hardly the case. Its current consumption may be tested as follows: Using a common ammeter, connect one wire with the commutator terminal on the coil, and the other on the ground, noting the current the coil takes. This should range from one-half to one ampere. There are coils in which the consumption is scarcely one-quarter ampere. If the trouble is not with the coil, it will be found in some leak in the system, as the dry cells should give vastly more service than you are getting out of them.

TIMING GEAR WRONG

Hillsboro, N. Dak.—Editor Motor Age—Will Motor Age give me some information relative to a one-cylinder Cadillac. I have taken the car all apart, cleaned it, ground the valves, put in new push-rod, all of which has not resulted in stopping the pounding, which sounds as if the piston hits the back of the cylinder. I have tightened the main bearings and connecting rod, adjusted the carbureter, but still the pound exists. If the timing was wrong, would it pound? When the machine was apart, I took the bearings out and it is possible I got the wheels turned a little. Are the gear wheels on the camshaft and main bearing marked so the timing can be corrected?—I. Nedland.

The undoubted trouble is that you have not placed timing gears on in proper position, and the best solution is to write to the factory for complete instructions. You may work this out yourself, however, according to the following scheme: Turn the crankshaft until the piston is at the outer end of the stroke, and then enough further until it is $\frac{1}{16}$ inch from the end on the suction stroke. At this point, place the camshaft so the cam is just closing the exhaust valve. This should give the proper time for closing the valve and if the closing is correct the opening will look after itself. It is an undoubted fact that the pounding you speak of is caused solely by a too early spark, which has been occasioned by the trouble with the timing gear. In case you discover that the pound continues after the timing gear is corrected look for pre-ignition and carbonization. You may be feeding too much oil.

IDEAL NEBRASKA CAR

Stanton, Neb.—Editor Motor Age—I have a two-cylinder opposed 5 by 5, water-cooled Ideal car, built for rutty Nebraska roads. This machine is capable of going anywhere and everywhere at a speed of 40 miles an hour on good roads. Mud has no terrors for this machine. I have traveled in mud up to the rear sprockets, going on high gear on level roads. I have no tire troubles, using solid tires which ride as easy as any pneumatic tire machine selling for $1,250.—Godfrey Lund.

Motor Car Shop Kinks

Aids for the Amateur

FLUSHING THE LUBRICATOR

A LUBRICATOR in which pressure is maintained by connection with the exhaust pipe gradually accumulates particles of soot, which find their way past the filter usually interposed in the pressure connection, and in time probably clog the filter itself. In addition to emptying the lubricator and washing with kerosene, it is frequently well to flush the sight feeds and oil distributing pipes also; and this is easily done where pressure can be put on the same without running the engine—which, if continued for more than a few moments, would be rather dangerous to the bearings and pistons. Sometimes it may be necessary to make a special fitting for the filler opening so that air can be pumped in with a tire pump.

WEAR OF SHACKLE BOLTS

Comparatively few even of the best cars have adequate provision for lubricating the bolts at the end of the spring shackles. Oil holes, if drilled, soon clog with dirt, and the only convenient recourse is to wipe off the dirt as well as possible around the bolt heads and squirt oil into the cracks, trusting to luck that some will find its way where it will do good. Often, too, the bolt is not held from turning in the shackle as it should be to compel the movement to take place inside the spring eye where there is surface enough to minimize wear. When the bolt turns in the shackle it may be cut half through before its condition is discovered through the accidental breaking of a spring or some other chance. The only way to be sure of the condition of these bolts is to take them out, and this should be done in the course of the winter overhauling. It may be possible to drill the bolts and thread small oil or grease cups into them, and this should always be done if new bolts have to be made.

PROCEDURE IN RIVETING

Frequently, when an old car is overhauled, the frame rivets will be found loose. Another point where loosening begins early is the attachment of the frame members supporting the steering gearbox. The stresses on this box due to road shocks are very considerable, and the box may work loose on its bolts or the frame members supporting it may work loose on their rivets. Again, a riveted spring hanger may break in going over a bad bump. If a spring hanger or other new piece is to be riveted in place, first clamp it and mark one hole, drill that hole, put a bolt through it temporarily, and mark the other holes. Scribe the circles for these holes and mark them lightly with a prick punch. Prick punch the centers and see that the drill does not run outside the punch marks on the circle. If the drill starts to run off, stop before the drill point has cut its full diameter, and draw the hole towards the center by means of a center punch or a round nosed chisel. A better job will be made by reaming the holes after drilling. This is not essential for riveting, though it is very necessary when bolts are to be used.

Select rivets of suitable length to form a good head. If they are too long, the ends cannot be headed over before they cool. Bolt the parts tightly together, using at least two bolts, and do the riveting as near the fire as possible so the rivets will not have time to cool. Drive the rivets solidly home and back them with a heavy sledge while heading them over, as the work must be done fast and it is necessary to hit hard. If a rivet cools before it comes to shape, cut it out and try again. The shrinkage of the hot rivet after the head is formed plays an important part in binding the parts together. If the rivet holes have been enlarged by the play of loose rivets it may be necessary to ream them to the next larger size, as the rivet must be upset sufficiently to fill the hole solid. Before riveting, try cold rivets in the holes and see that they go in freely, as they will expand a trifle when hot.

LEATHER STRAPS EN TOUR

Leather trunk and bag straps may have unexpected usefulness when one is touring. For example, on one car the poorly supported radiator once shook loose from its brackets. A trunk strap which happened to be in the locker was passed over it and under the frame to hold it down, and a couple of short pieces of board, cut to suitable shape and wired together at the front and back of the lower corner by wires passing through the radiator coils, held it from shaking back and forth at the bottom. The top, fortunately, was already steadied by a rod running back to the dash, but if necessary, a strap or heavy cord could have been passed around the filler and back to the dash to hold the radiator against the bonnet. Recently, a pair of small bag straps were found useful when a front spring was discovered to be broken in two at the axle seat. The car had run some miles before the break was discovered as the two spring clips held the parts of the spring from separating entirely. The front end of the frame was jacked up to relieve the spring and a hardwood board 1¼ inches thick and 4 or 5 inches wide was hunted up. The board was cut about 2 feet long and the ends roughly trimmed to 2½ or 3 inches wide. A short nail was driven in each end to prevent the straps from slipping off, and the board was laid on top of the rubber bumper and the ends drawn down as tightly as possible to the spring and strapped. This relieved a considerable portion of the load on the spring ends, and the car was safely driven home without further sagging or spreading of the spring.

PREVENTING CREEP OF TIRES

A studded rear tire will creep sooner than a smooth one, because it does not slip so easily. If the tire shoe be old and well stretched, the air pressure plus the ordinary bolts may not be sufficient to prevent creeping, and the inner tube may suffer in consequence. An effectual remedy for most cases is to supply one or possibly two extra bolts next to the valve. The valve itself does not help to hold the shoe against creeping, and the tire is consequently least secure at that point.

SIDE PULL OF BRAKES

Many brake shoes acting on the rear wheels are subject to more or less side pull owing to the tension rods not acting in a straight fore and aft line. This results in wearing the shoes and drums sidewise and giving rise before long to objectionable play and rattle. Frequently, it is possible to attach a small guiding bracket to the stationary support in such a manner as to take the lateral component of the brake rods pull and compel the brake shoes to keep their normal position. The same thing applies occasionally to the running brake, whose tension rod does not always run exactly straight.

OVERCOOLING IN WINTER

A radiator and fan designed to give the best temperature in summer will cool the engine too much in winter. If the car is used in very cold weather it may be quite feasible to remove the fan belt altogether without producing overheating. If this is found impracticable, a sheet of tin may be made to the outline of the upper portion of the radiator and wired to the back of the radiator to cut off a portion of the fan draft. The size of this sheet will be a matter for experiment. The wires which hold it should pass through the air space of the radiator and over small wood, fibre, or rubber protectors to prevent chafing the front edges of the radiator tubes. The radiator in normal usage should be hotter than the hand can comfortably bear. In summer weather it is frequently wise to stop the water circulating through the carbureter waterjacket.

THE UTILITY OF CLUTCHES ON MOTOR CARS

THERE are few clutches of the type involving the expanding band, and, as a rule, they are not so good as to warrant their use. The mechanism required to move the shoes is complex, and centrifugal force is bound to play an undesirable part. If the shoes are manganese bronze with cork inserts, as in Fig. 3, the surfaces will hold to the work to a marvelous extent, provided the mechanism is such as to serve for the clutching function to an adequate degree. Cone clutches of the conventional sort were once so prevalent as to lead one to the conclusion that they were the permanent standard. Fortunately, there is no such a thing as a standard, excepting in so far as principles must hold throughout the designs.

The earlier cone clutches were faced with leather, riveted onto the periphery, without any means of providing for evenness of contact. The leather thus did not serve the purpose well, and the next important improvement was by way of flat steel springs under the leather facing, with a view of pressing the leather into contact at numerous points around the entire circumference. This scheme made cone clutches possible. For a time after this innovation it looked as if cone clutches were the acme of perfection, but the adoption of cork inserts protruding through the leather rendered the clutches far more stable and lasting. Cork inserts, if well placed and of sufficient surface, work very well indeed without any leather.

Fig. 4 shows a leather-faced cone clutch with the cork inserts A located around the periphery. The same figure will serve to illustrate this particular type in general, since the only difference lies in the application of the cork, in which event the section of the aluminum spider must be provided with inwardly projecting "bosses" in which the holes may be drilled to take the corks. With the cork inserts there is a slight increase of weight if leather is used as well. If, on the other hand, cork alone is used, the weight is lower for the cork-insert cone clutch than it is if the leather facing is used. Leather is heavy, especially if we consider that the requirement for the average cone clutch is not far from 75 cubic inches. It must also be borne in mind that the leather is at the extreme radius, where weight is the greatest detriment. Through the courtesy of the National Brake and Clutch Co. I am enabled to offer some data of the performance of cork in clutch service, which data was procured by that company for the purpose of aiding designers in the process of applying cork to the class of work of the subject for brake shoes such as are used in motor car and other work.

CORK FRICTION WITHOUT OIL

Fig. 5 gives the pressure and equivalent friction of cork on steel without lubrication, the cork being inserted in cast iron

EDITOR'S NOTE—This is Part II of a series of articles on clutches by Thomas J. Fay, president Society Automobile Engineers. Part I appeared in Motor Age October 15. Additional articles will follow.

FIG. 3
BRAKE BAND WITH CORK INSERTS

disks or plates of sufficient thickness. As will be seen by inspecting the chart, the frictional resistance for one pair of plates without the cork inserts is about 80 pounds if some 500 pounds pressure is applied. It will also be seen that 20 corks in a similar plate, under the same pressure, just double the friction. This is equal to saying that the clutch ability is double. The same curve or chart shows a variety of possibilities, using various numbers of inserts, and it shows that the resistance is not in direct proportion to the number of inserts, considering a given pressure. The exact test as reported by Professor John R. Nichols of Harvard is worthy of note in that it gives more exact values than can be taken from a chart, although the latter affords a bird's-eye view of the whole performance, which would be lost in a tabulation. See table below.

If the pressure is applied directly, as in the case of the loaded flat plate bearing upon a "platen," for the purpose of ascertaining the coefficient of friction, the resistance will be equal to the load in pounds multiplied by the coefficient of friction in any given case, but if the pressure is increased enough to compress the cork and enable the metals to contact and to press on each other, there will be an added resistance which may be determined as follows:

$$R = F\,W + N\,A\,(K - a),$$

where R = resistance to motion in pounds;
W = total load on plate in pounds;
F = Coefficient of friction of the metals used;
A = total area of the plate in square inches;
K = area of the cork in per cent of A;
N = a constant, depending upon the nature of the materials and the prevailing conditions;
a = another constant.

This formula, devised by Professor John R. Nichols, was extended and applied by him in the manner as follows:

The first modification of the formula is indicated as follows:

$$r = Fw + N\,(K - a).$$

where r = the frictional resistance in pounds per square inch;
w = the pressure in pounds per square inch.

In a purely engineering sense, the formula is claimed to be accurate to a satisfactory degree, even above the critical point. The critical point, according to the authority stated, will occur as follows:

FOR CAST IRON

When $W = 0.7\,A\,(K - 5.6)$
$w = 0.7\,(K - 5.6)$

FOR BRONZE

When $W = 0.66\,A\,(K - 5.4)$
$w = 0.66\,(K - 5.4)$

According to the complex formulæ, the values of R and r may be found as follows:

FOR CAST IRON

$R = 0.16\,W + 0.118\,A\,(K - 5.6)$
$r = 0.16\,w + 0.118\,(K - 5.6)$

FOR BRONZE

$R = 0.14\,W + 0.126\,A\,(K - 5.4)$
$r = 0.14\,w + 0.126\,(K - 5.4)$

In all of the above cases the cork inserts are, of course, used in the cast iron, and in the bronze disks. The cork must be especially prepared to correspond with the quality known on the market as "Compo," as natural cork does not perform in quite the same way. A compact summary of the formulæ, taking into account the effect of a range of values, is given by the same author and is shown as follows on next page:

TABLE OF PRESSURE AND FRICTION OF CORK INSERTS

Load in Pounds	PLATE NUMBERS USED IN THE TEST: No. 1-0 Cork	No. 2-11 Cork	No. 3-14 Cork	No. 4-17 Cork	No. 5-20 Cork	No. 5-48 Cork
	RESULTANT FRICTIONAL RESISTANCE IN POUNDS					
50	7.5	17.5	17.5	17.5	17.5	17.5
100	15	35	35	35	35	35
150	22.5	53	53	53	53	53
200	30	63	70	70	70	70
250	38	70	85	88	88	88
300	45	77	94	105	105	105
350	53	85	101	117	122	123
400	60	92	109	125	131	141
450	68	99	117	133	139	159
500	75	106	124	141	148	176
550	83	113	132	149	156	...

FOR CAST IRON—CORK—ON CAST IRON

When W is less than 0.7 A (K — 5.6)

$R = 0.33\ W$

When W is more than 0.7 A (K — 5.6)

$R = 0.16\ W + 0.118\ A\ (K - 5.6)$

The corks, 1 inch in diameter in holes—put in wet under pressure—were in plates of castiron 5 inches wide by 10 inches long, and were smoothed down to a uniform bearing and pressed against a clean dry steel surface; the castiron plates were ¾ inch thick. The resistance offered was that of the plates with cork inserts considering the loads in pounds as given at a low speed. The consequences of a high velocity were not here taken into account. This is not necessary to consider in ascertaining the coefficient of friction, although it may be well to keep the difference in the mind's eye, against the time when the conditions to be met, in any given case, may introduce a variable.

The question will naturally arise as to how much of the friction is due to cork, as against other materials, such as dissimilar metals in contact with each other. This is a matter that can be disposed of if tests of the dissimilar metals are taken. The following tabulation will show the results of metal-to-metal contact, under the same conditions and by the same authority, made at the same time and place. The test, then, should bear a close relation.

Load in Pounds	Cast Iron on Cast Iron Resultant	Cast Iron on Steel Frictional	Bronze on Cast Iron Resistance in
	Pounds		
50	8.1	7.5	7
100	16.2	15	14
150	24.3	22.5	21
200	32.4	30	28
250	40.5	38	35
300	48.6	45	42
350	56.7	53	49
400	64.8	60	56
450	72.9	68	63
500	81	75	70
550	89	83	77

The tests as above indicated for metal-to-metal contact were made on plates 10 inches long by 5 inches wide, with polished surfaces, free of any foreign substance. The area of the plates, then, was $10 \times 5 = 50$ square inches, and for 500 pounds the pressure per square inch was:

$$P = \frac{500}{50} = 10 = \text{pounds per square inch.}$$

It is plain to be seen that differences in metals influence the friction, but it is equally plain that cork increases the friction very greatly indeed, in comparison with metal-to-metal, no matter what metals are used. If the coefficient of friction is taken as the resistance, divided by the pressure, then the coefficient for bronze on castiron may be taken as:

$$F = \frac{70}{500} = 0.14$$

On the other hand, if cork inserts are used in the bronze plates on a basis of 20 per cent cork surface, the coefficient of friction will be:

$$F = \frac{131}{500} = 0.262$$

These relative results are of no great value, because they do not take into account practical conditions that cannot be avoided. In practice, oil will furnish a slippery surface in the case of the metal-to-metal contact, and unless the pressure is very high the slippery surface cannot be eliminated. On the other hand, the cork coefficient of friction does not seem to be effected by the oil film in any marked degree, and high pressures are not required to get rid of the slippery surface. The life of the members will be far longer if the pressure is low, and with cork the life can be prolonged because the pressure can be low, even if oil does get on the surfaces, and in a motor car it is almost impossible to keep it off.

CORK FOR METAL-TO-METAL TYPES

If, however, a clutch is designed for metal-to-metal contact, involving enormous pressures, it will not be very practical to insert cork as a final act of defense, because the conditions will not be the best for cork. Failures oftentimes result because the conditions that are necessary under certain circumstances are impressed into service under a change in the nature of the requirements. In the use of cork inserts there are two fundamental conditions to be taken into account: A. When the pressure is not so high as to cause the metal to contact. The time when cork is in contact with metal. B. When the pressure is so great as to compress the cork enough to indicate metal-to-metal contact.

FOR BRONZE—CORK—ON CAST IRON

When W is less than 0.66 A (K — 5.4)

$R = 0.33\ W$

When W is more than 0.66 A (K — 5.4)

$R = 0.14\ W = 0.126\ A\ (K - 5.4)$

FOR CAST IRON—CORK—ON STEEL

The formulæ will be modified as follows:

$R = 0.15\ W = 0.124\ A\ (K - 4.5)$

$r = 0.15\ w + 0.124\ (K - 4.5)$

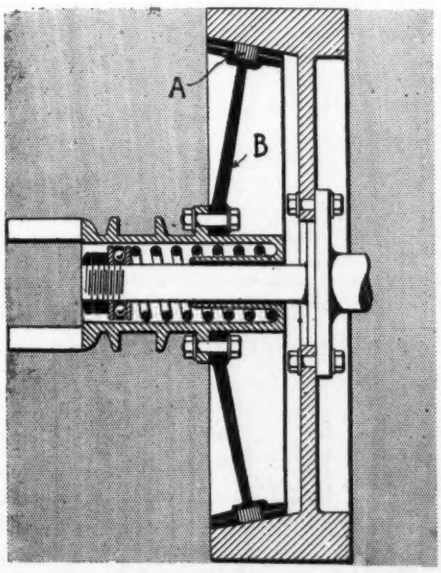


FIG. 4
CONE CLUTCH WITH CORK INSERTS

The critical point occurs when $W = 0.62\ A\ (K - 4.5)$ or $w = 0.62\ (K - 4.5)$.

The summary involving a range of values may be taken as follows:

FOR CAST IRON—CORK—ON STEEL

When W is less than 0.62 A (K — 4.5)

$R = 0.35\ W$

When W is more than 0.62 A (K — 4.5)

$R = 0.15\ W + 0.126\ A\ (K - 4.5)$

The above work has the sanction of Professor Ira N. Hollis, also of Harvard, under whose supervision the tests were conducted. The deductions are much more complete and reasonable than usually can be attached to tests of this sort. They apply in this case to a marked degree, because they were conducted with a view to the motor car, whereas the tests generally available are of a nature not taking the motor car into account, or of so abstract a nature as not to directly apply. Professor Nichols compiled a table for use in spacing cork inserts with a view to fixing upon the percentage of the total surface that the cork inserts should occupy, on a basis of quick and accurate results. The table is given here without modification. As will be observed, the cork inserts are pressed into holes, or sockets.

ASBESTOS BRAKE FACING

While the opportunity affords, it may be well to mention the fact that a new class of clutch and brake facings is now in use, that is, facings of asbestos, interwoven in a wire mesh in such a way as to afford the higher resistance of asbestos and the mechanical strength of wire. In a general way, it is quite possible that the action of these facings will be found to be with a critical point. In other words, they will probably be found to act differently under great pressure than will be the case with comparatively little pressure. In a 12-hour non-stop run of a Chalmers-Detroit 30, over mountain roads, made by the author September 27, 1908, an opportunity was afforded to try out this class of facings on brakes, and it seemed to the author as if the initial friction—per pound of effort—was more pronounced than the later effort.

The results, on the whole, were very satisfactory, and the brakes were just as effective at the end of the 240 miles of the hardest kind of work as they were on the start. The ordinary fabric would have given out long before the end of the run, as the author found by an actual run with another car over the same course. The Nichols formula would probably apply to the use of the asbestos product as well as to the cork inserts, subject to a correction of the constants of the formula. In the case of the asbestos—wire mesh—products, the pressure can be applied to an extent such as will compact the fiber enough to engender more nearly the metal-to-metal conditions than can be possible with the fabrics in which there is no metal binder. It is true, of course, that the percentage

of metal will be small, relative to the total surface, but it is true as well that the percentage of cork, if increased beyond certain points, does not evolve a corresponding increase in results. In other words, there is no occasion for having more than a certain percentage of the total surface covered by the cork inserts.

THE STATUS OF LEATHER

When it comes to leather, red fiber and such materials, there is no compounding of the effect on critical point or a change in the coefficient of friction before the change in structure due to charring as a result of a greater temperature than the materials will withstand. Wood chars at about 550 degrees Centigrade, and bursts into flame at about 600 degrees Centigrade. Leather will show effect of heat considerably sooner, and the coefficient of friction will change as soon as the leather suffers any change in character. When leather is subjected to the combined action of pressure and heat it loses its oily condition and becomes "as hard as a board."

In this "crusty" condition leather is no longer suitable for the purpose, because it will no longer act in the same way. The leather will not cling to the same extent, or anything like it, and as a consequence the spring strong enough to do the work with the leather in its most receptive state will be too weak when the leather becomes hard, unyielding and glossed over. Red fiber has the ability of wood—it is wood—as long as it lasts. It does not last long enough, as a rule, in work of an exacting character. Wood has long been used in its natural state for frictions in brakes and clutches, and it seems to be more durable than the fiber. In motor car work wood cannot well be applied, because of the spinning tendency, if the friction member is of any great weight, at a distance from the axis of rotation.

COEFFICIENT OF FRICTION

It was said the tests given in connection with the cork inserts were at a low speed, such as that due to drawing a flat plate over a smooth surface at a low speed. This coefficient does not, of necessity, show what would follow were the friction members caused to rotate at a high speed. Indeed, there are clutches that will not engage at a high speed, and the motor has to be slowed down. In general, it is conceded that the laws of friction will be different as the materials and the state in which they reside are varied. We have to consider, then, the laws as follows: A, the friction of solids; B, if the solids are unlubricated; C, rolling friction; D, fluid friction; E, intermediate conditions.

Rolling friction may be stated as the force required to slide one body over a relating body, between which bodies rollers or spheres are interposed, in some cases to reduce the friction of rolling and in other instances to the detriment of the process, if, in the latter case, the resistance is desired on a basis of the maximum.

In ball-bearing work, the absence of friction is the quantity desired, whereas in clutch work the friction is sought. In clutch work, oil interposes a slippery surface and the coefficient of friction of the oil is the result. Oil then is not as a roller. Sand or other hard foreign substances might be regarded as having the properties of rollers. A ball-bearing in thrust might be as a friction member if the thrust is high enough to pinch the balls into wedge-shaped grooves. The law of rolling friction was well set forth by Henry Hess in a paper before the Society of Automobile Engineers, at the summer meeting of 1907, in Buffalo. This question will be of no further profit here because clutches are not as yet built of ball-bearings in thrust to such an extent as to engender enough friction to enable them to perform the clutching function.

Friction of Rest

The force required to start a body sliding is called the friction of rest—Kent. This phenomenon requires a little elucidation in order that it will be the better understood. When a member is at rest, the oil is squeezed out—because of the time allowed—and solid friction is the result. The friction of rest, then, is substantially "solid friction," and instantly the body is caused to rotate oil is picked up and thrust into the space, with the result that the friction of the slippery surface is the phenomenon to be noted. In the one case the coefficient of friction is that of solids on solids, and in the other instance it is the coefficient of friction of the lubricant.

The Friction of Solids

A. If the solids are of a fibrous nature the friction will probably decrease as the pressure increases. The friction will also decrease with increasing speed. The cork insert illustrates this set of conditions adequately, in that increasing pressure results in a critical point if the pressure is increased enough to bring about metal-to-metal contact. The curve of friction is maintained—as the formulæ show—because, as the friction of the cork tends to diminish under pressure the friction of the metal-to-metal makes up for the deficit.

B. The friction of non-fibrous materials will be proportional to the pressure only—within the limits of abrasion. Here, again, is evidence of the fact that a soft, yielding mass is of considerable advantage, if the mass is backed up in such a way as

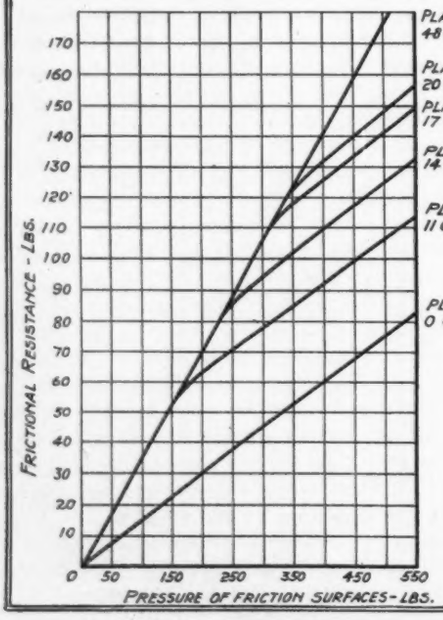


FIG 5

"COMPO" TESTS BY JOHN R. NICHOLS, WITH CAST IRON PLATES 5 BY 10 INCHES ON CLEAN, DRY STEEL SURFACE, VELOCITY LOW FOR SUCH WORK

DIA. = 1/2 INCH		DIA. = 5/8 INCH	DIA. = 3/4 INCH	DIA. = 7/8 INCH	DIA. = 1 INCH
S	K%	K%	K%	K%	K%
1 INCH	19.6 %	31.7	44.2	60.	
1 1/8 "	15.5	24.3	35.	47.5	
1 1/4 "	12.6	19.6	28.3	38.5	50.3
1 3/8 "	10.4	16.2	23.5	31.9	41.6
1 1/2 "	8.7	13.6	19.7	26.7	35.
1 5/8 "	7.5	11.6	16.8	22.8	29.8
1 3/4 "	6.4	10.	14.5	19.6	25.7
1 7/8 "	5.6	8.7	12.6	17.2	22.4
2 "	4.9	7.7	11.	15.	19.7
2 1/8 "	4.4	6.8	9.8	13.3	17.4
2 1/4 "	3.9	6.1	8.8	11.9	15.6
2 3/8 "			7.9	10.7	14.
2 1/2 "			7.1	9.6	12.6
2 5/8 "				8.7	11.4
2 3/4 "				8.	10.4
2 7/8 "				7.3	9.5
3				6.7	8.7

FIG. 5A

"COMPO" TESTS BY JOHN R. NICHOLS, IN WHICH DIA. = DIAMETER OF SOCKETS, S = CORK SPACING, AND K = PER CENT OF CORK TO TOTAL AREA OF SURFACE IN TEST METAL

to allow of solid friction at the higher pressures. The reason for this lies in the fact that the soft yielding mass will afford the maximum resistance at the lower pressures and speeds, while the later metal-to-metal contact will introduce the increasing resistance with increasing pressures and speeds.

C. Increasing hardness is attended with decreasing resistance. This is adequately illustrated in leather facings when they become charred and glossy. Hardened steel disks also act in the same way. The spring pressure in a clutch will have to be greater for hardened steel on steel than it will have to be for bronze on steel or bronze on cast iron.

D. The limit of abrasion is the limit of ability in clutch work at any rate, and this limit will increase with the hardness and toughness of the materials in contact. Hardened steel on steel, then, possesses the virtue of a high limit of abrasion, and can well sustain high pressures.

E. If the surfaces are lubricated, it is the friction of the lubricant that must be taken into account up to the time the pressure is high enough to expel the lubricant.

Unlubricated Solid Friction

The behavior of unlubricated solids, caused to slide upon each other, is such as to render the mistakes of designers fully accounted for. They sometimes use the coefficient of friction, as determined at a low speed, assuming that it will represent the friction that will obtain at a high speed. On the contrary, the unlubricated friction will decrease with increasing speeds, at first rapidly, thereafter less rapidly, and ultimately follow no man's law; in practice, at any rate. To be safe is to allow for a fall in the coefficient of friction in clutch work wherein the lower friction is a detriment, since friction is what is wanted. It is a well understood fact that bearings, for illustrations, run easier at higher speeds than they do at low speeds. This is true if they are lubricated or if they are not, up to a certain point.

Regarding Fluid Friction

This is a phenomenon that should receive some consideration in clutch work because of the drag of the clutch, due to the fluid friction, in the class of clutches of the disk type in which the disks are submerged in oil. Fluid friction has recognized characteristics, as follows:

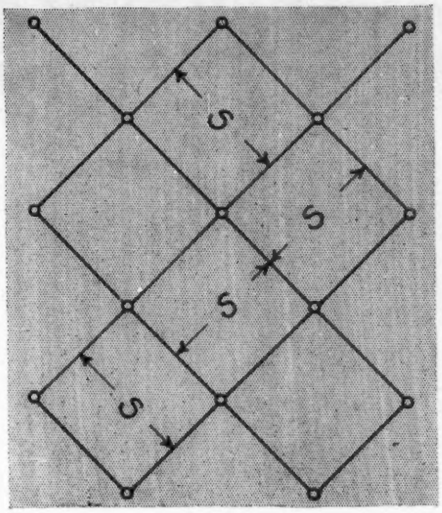
The friction is in direct proportion to the wetted surfaces, hence in direct proportion to the number of disks in the clutch.

So long as the oil stays between the plates—disks—the fluid friction is independent of the pressure.

The friction is proportional to the square of the relative velocities at the higher speeds. The drag of the clutch will then increase enormously with the speed of the motor.

If the speed is low, the friction will be proportional to the velocity.

The friction will not be influenced by



SPACING OF CORK IN CORK-INSERT TESTS

the generic nature of the metals in contact. This is to say, as long as it is fluid friction it matters not of what metal the disks may be.

The degree of smoothness will have some bearing, but clutch disks are never enough to have any influence on the friction of the fluid. Were they put in rough they would promptly wear smooth.

The resistance—drag of the clutch—will be proportional to the density of the fluid—oil—and the viscosity of the fluid will also have a bearing on the performance.

The unctuousness of the fluid will have bearing upon the performance of the clutch, as is adequately proven from the fact that light grades of cylinder oil will not act well until they are charged with their own weight, approximately, of kerosene. The unctuousness of kerosene is almost a minus quantity, while the light cylinder oil is of a high value.

The mobility of the oil has a considerable bearing on the performance of the clutch from the point of view of drag. If the oil falls off in density as the temperature increases, it is a mobile product and not so desirable for a clutch, for the reason that the density of the oil will be very marked when the temperature is very low, as it would be in winter.

SOME COEFFICIENTS OF FRICTON

Leather—Gen. Morin—	—
On clean, dry, smooth metal	0.56
On wet metal	0.36
On greasy metal	0.23
On oily metal	0.15
*Dry, compressed, charred leather; on greasy, polished metal	0.08

As will be observed, leather furnishes all the conditions between the most satisfactory possible, when it is new and well applied, to the most abject failure, from the clutch point of view. No motorist of experience has escaped the two extremes.

The question of the applied pressure is one that probably belongs to lever systems, in so far as the several modes of application are concerned. In the main, however, it does not seem desirable to separate the subjects. The foot pressure should not be so little as to render it impossible to use the pedal as a foot rest. On the other hand, the pressure should not be so great as to make it tiresome to press the pedal and hold it down. Forty pounds should be about the right pressure, with the clutch open and the initial pressure should, and would, be less.

ACCELERATION CAR TESTS

London, Eng., Oct. 14—Last week S. F. Edge arranged with the Brookland Racing Club to test the acceleration of cars, using in the test a 90-horsepower six-cylinder Napier, and a 60-horsepower six-cylinder machine of the same make. The acceleration testing device is extraordinarily simple, consisting of a string attached to a drum and wound thereon, and the other end attached to the car; when the car starts the string unwinds, and as the drum is electrically connected to the apparatus for recording results, the data gained is unquestionably accurate. The accompanying tables show the acceleration figures of the two cars, which are worth careful study, in that the acceleration on the 90-horsepower machine was absolutely continuous from start to finish; whereas, on the 60-horsepower car there was a drop.

ACCELERATION TESTS OF A 60-HORSE-POWER CAR

Intervals of time elapsed from start —Seconds	Ft. of space traversed since start, approx.	Ft. of space covered in each interval of time, approx.	Velocity at end of each interval of time (mean of two intervals) in miles per hour, approx.	Acceleration during each interval of time, approx.
0.5	1.5	1.5	2.05	....
1.0	3.0	1.5	3.31	....
1.5	6.36	3.36	5.63	1.86
2.0	11.25	4.89	7.73	1.53
2.5	17.7	6.45	10.43	1.56
3.0	26.55	8.85	11.8	2.4
3.5	35.0	8.45	13.22	0.4
4.0	45.96	10.96	16.15	2.51
4.5	58.68	12.72	18.25	1.76
5.0	72.72	14.04	19.92	1.32
5.5	87.9	15.18	21.4	1.14
6.0	104.1	16.2	22.91	1.02
6.5	121.5	17.4	24.67	1.2
7.0	140.58	19.08	27.16	1.68
7.5	161.34	20.76	29.6	1.68
8.0	183.0	22.66 ab't	33.27	1.90

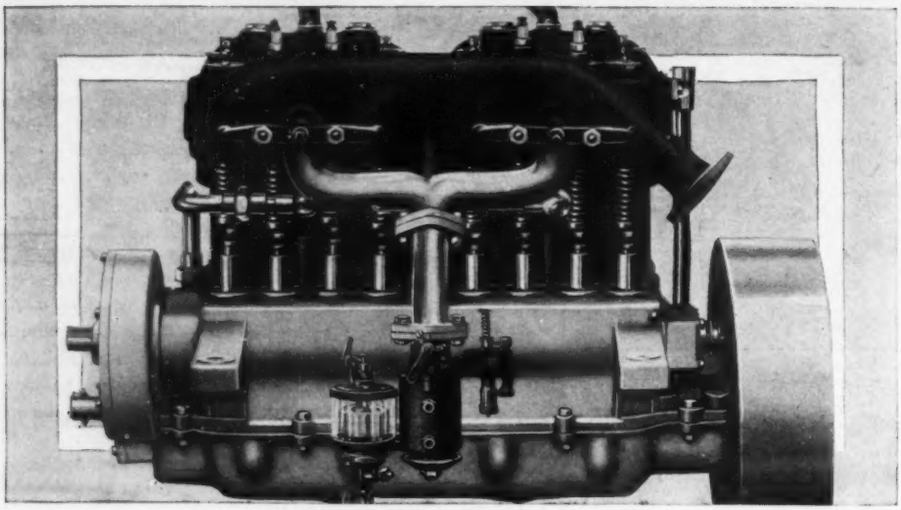
Average acceleration from start, 5.7188 ft. per second.

ACCELERATION TESTS OF A 90-HORSE-POWER CAR

Intervals of time elapsed from start —Seconds	Ft. of space traversed since start, approx.	Ft. of space covered in each interval of time, approx.	Velocity at end of each interval of time (mean of two intervals) in miles per hours, approx.	Acceleration during each interval of time, approx.
0.5	....	....	....	....
1.0	....	....	....	....
1.5	3.78	....	....	....
2.0	6.9	3.12	5.05	....
2.5	11.19	4.29	6.91	1.17
3.0	17.04	5.85	8.73	1.56
3.5	24.0	6.96	10.57	1.11
4.0	32.55	8.55	12.27	1.59
4.5	42.0	9.45	14.2	0.90
5.0	53.37	11.37	16.36	1.92
5.5	66.0	12.63	17.71	1.26
6.0	79.35	13.35	19.74	0.72
6.5	94.95	15.6	22.33	2.25
7.0	112.1	17.15	24.65	1.55
7.5	131.1	19.0	26.32	1.85
8.0	150.7	19.6	26.85	0.6
8.5	170.49	19.79	28.16	0.19
9.0	192.0	21.51	31.03	1.72
9.5	216.0	24.0 ab't	35.59	2.49

Average acceleration from start, 4.7867 ft. per second.

MOTOR CAR DEVELOPMENT



VALVE SIDE OF KISSEL CAR 1909 MOTOR

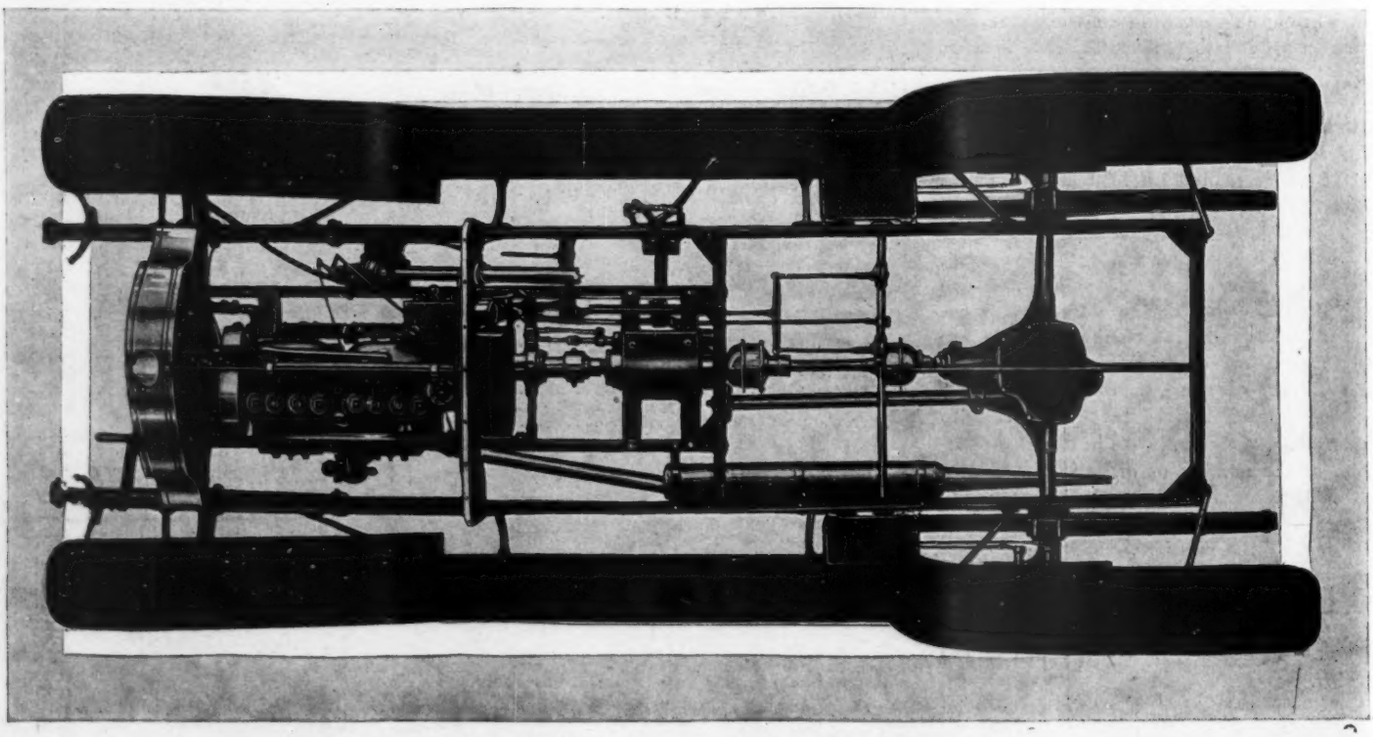
SPECIFICATIONS

40-HORSEPOWER TYPE

Motor—Four-cylinder, twin castings
Bore—4¾ inches.
Stroke—4¾ inches
A. L. A. M. horsepower rating—36.1 horsepower
Transmission—Selective, three speeds
Rear axle—Floating, Timken bearings
Front axle—Dropped I-beam
Brakes—Internal and external rear hubs, 14 by 3-inch drums
Wheelbase—115 inches
Wheels—36 inches, with Q. D. rims
Rear springs—Three-quarters elliptic
Ignition—Atwater-Kent, or Remy magneto
Body styles—Touring car and roadster

THREE chassis types of Kissel cars are listed for 1909, one a carried-over model with improvements; the others new creations. The carried-over style is a 36.1-horsepower, four-cylinder car regularly rated at 40-horsepower. The new models are a 28.9-horsepower, five-passenger car, also built in roadster and tourabout lines; and a six-cylinder 60-horsepower machine which, according to A. L. A. M. has a 54-horsepower rating. In all three types the Kissel Motor Car Co., with its factory at Hartford, Wis., follows the same design which can be summarized as using such cardinal constructions as cylinders in pairs with valves on the left side, cone clutch, selective gearset, shaftdrive, a general use of Timken bearings, and double ignition.

The cars show many improvements over the constructions of the present year, many of which can be gleaned from the 36.1-horsepower model which is a continuation of this year's car. The road wheels have been increased from 34 to 36 inches in diameter; the wheelbase lengthened from 108 to 115; the I-beam axle dropped so it affords a carriage 2 inches lower than this year; in the rear axle Timken roller bearings are used in front and rear on the driving pinion; brakes have been increased from 11 to 14 inches in diameter with 3 inch width; the emergency lever is pulled instead of pushed in applying the brakes; instead of the four-unit coil in the ignition system, use is made of an Atwater Kent generator, or Remy magneto, and when the latter is employed a single unit non-vibrating coil is used with it; steering spindles are heavier; all operating levers are made from drop forgings; Spicer universal joints have been introduced into the propellorshaft; the body is made of metal and in straight line design; three-quarter elliptics support the rear, where semi-



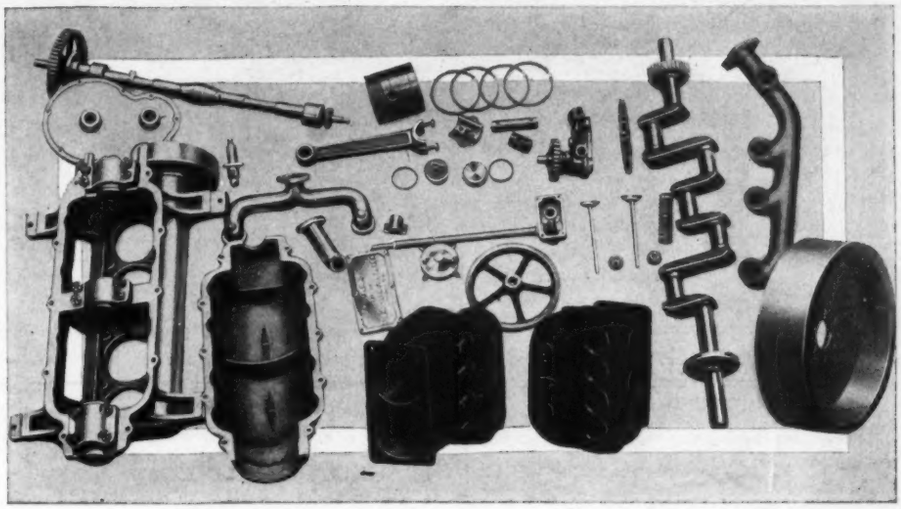
1909 KISSEL CAR CHASSIS WITH ALL OF ITS PARTS IN PLACE

THREE TYPES 1909 KISSEL CAR

SPECIFICATIONS

30-HORSEPOWER TYPE

Motor—Four-cylinder, twin castings
Bore—4¼ inches
Stroke—4¼ inches
A. L. A. M. horsepower rating—28.9 horsepower
Transmission—Selective, three speeds
Rear axle—Floating, Timken bearings
Front axle—Dropped I-beam
Brakes—Internal and external rear hubs, 14 by 3-inch drums
Wheelbase—107 inches
Wheels—32 inches, with Q. D. rims
Rear springs—Three-quarters elliptic
Ignition—Remy magneto and Atwater Kent
Body styles—Five-passenger car, surrey and roadster



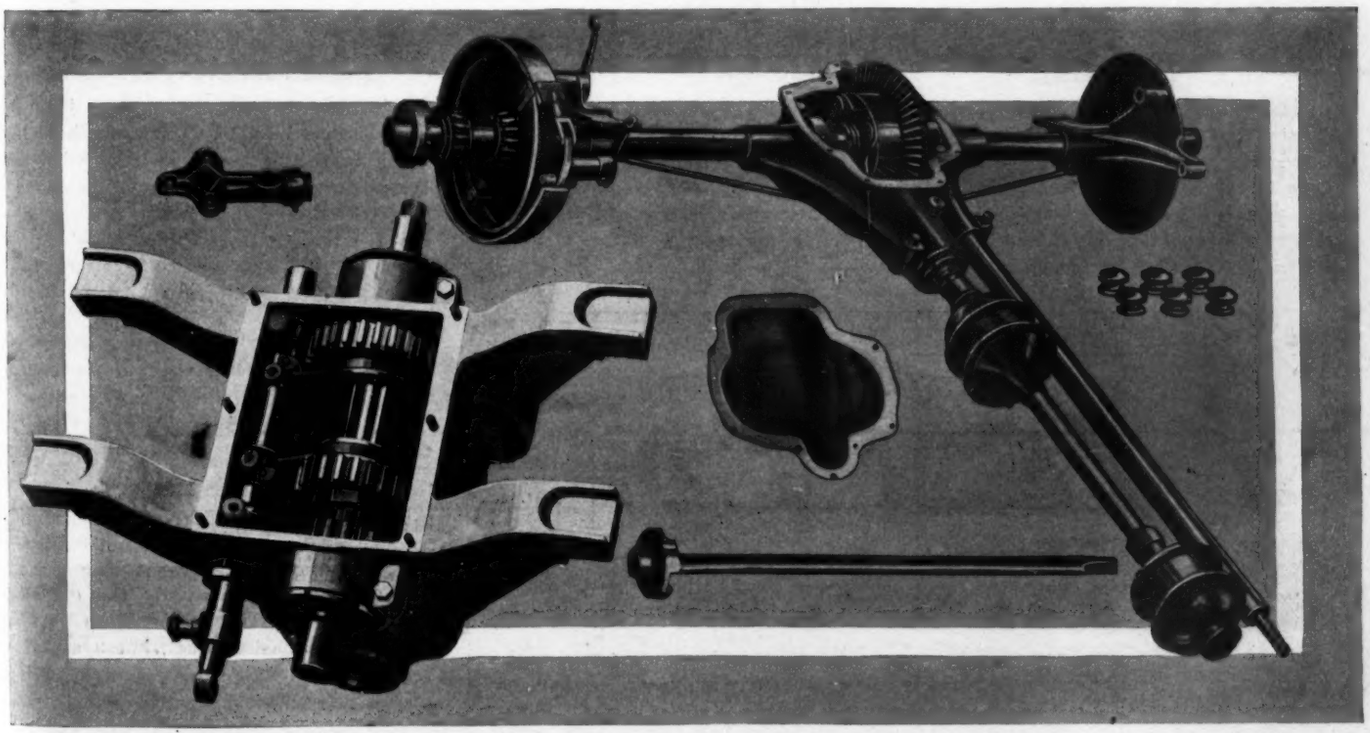
GROUP OF MOTOR PARTS IN 1909 KISSEL CARS

elliptics have previously been employed; and making the tonneau 6 inches longer gives room for additional seats. To these changes could be added a list of minor ones, all of which show the care with which the next year models have been worked out.

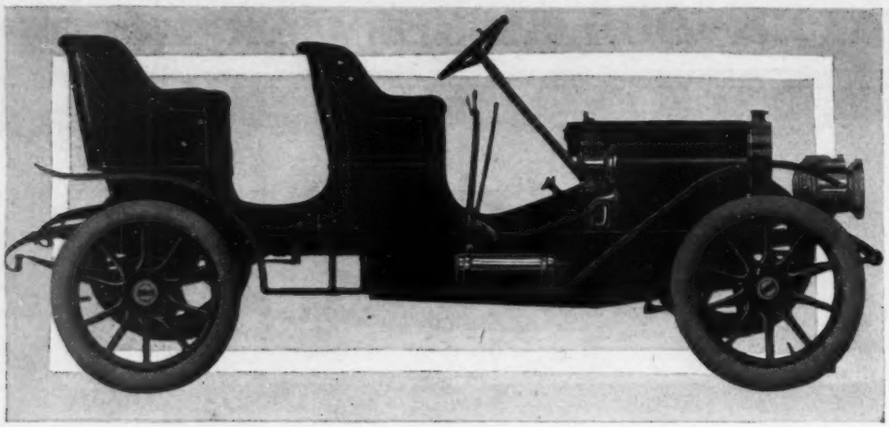
Of the two new models the 28.9-horsepower one will doubtless be the popular branch of next year's output. It is made with a 4¼-inch square cylinder, conventionally designed, with a two-part crankcase, three-bearing crankshaft, enclosed engine gears, and valves opened by direct lift from the camshaft through lifter-rods with rollers on their lower ends. The crankshaft goes through the usual machining and grinding process and is carried on hand-scraped babbitt bearings; the other motor parts, such as valves, camshaft, pistons and connecting rods, are carefully manufactured. Lubrication is by mechanicel force feed oiler carried on the right rear motor arm; the Stromberg carbureter is fitted and ignition is of the jump spark type. In the ignition outfit is given an Atwater Kent combination with dry cells and Remy magneto, single unit non-vibrating coil making a dual outfit.

In the 40-horsepower four-cylinder, and the 60-horsepower six-cylinder, use is made of a 4¾-inch square cylinder, made in twin castings along the design identical with that of the little motor. In these the ignition is similar, except that in the six, when built for seven-passenger use, a Bosch magneto is fitted.

Conspicuous in the Kissel car transmission is the use of an inside change speed lever, which operates through a slot in the floor of the footboard, which location has been used to obviate the boring of the side member of the frame to accommodate the shifter sleeve attached to the bottom of the chain speed lever. The transmission box finds support on the



KISSEL CAR SELECTIVE GEARSET AND FLOATING REAR AXLE DESIGN



KISSEL SURREY TYPE FOR FOUR-CYLINDER MOTOR

SPECIFICATIONS

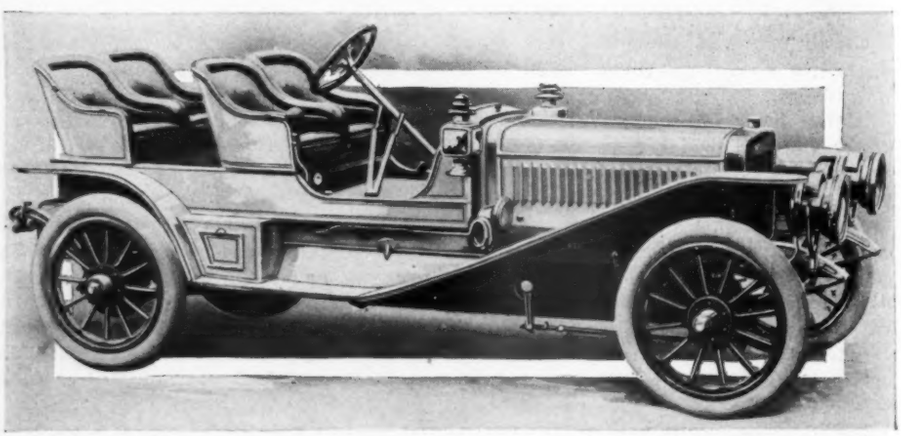
60-HORSEPOWER TYPE

Motor—Four-cylinder, twin castings
Bore—4¾ inches
Stroke—4¾ inches
A. L. A. M. horsepower rating—54.1 horsepower
Transmission—Selective
Rear axle—Floating, Timken bearings, reinforced
Front axle—Dropped I-beam
Brakes—Internal and external rear hubs, 14 by 3-inch drums
Wheelbase—130 inches
Wheels—36 inches
Rear springs—Three-quarters elliptic
Ignition—Atwater Kent system and Bosch magneto
Body styles—Seven-passenger touring car

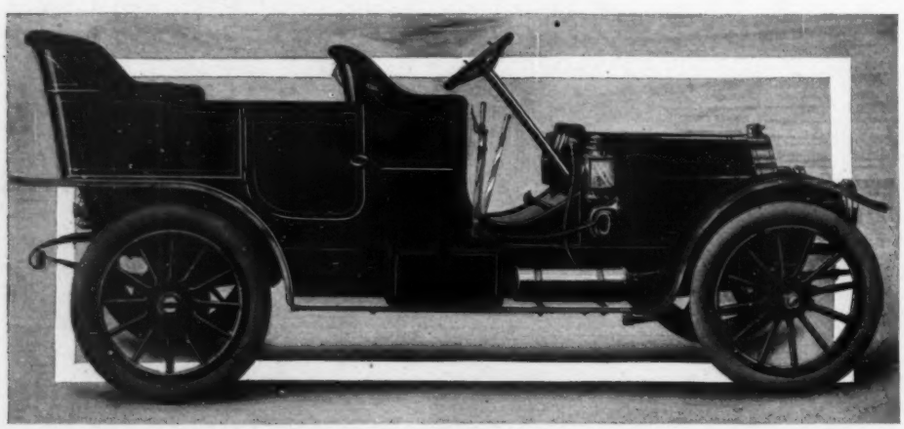
same subframe members which carry the motor, both of these important functionaries having a pair of integral side arms for support purposes. The Spicer universals, two of which are used in the propellorshaft, are fitted with hardened and ground pins and bushings and have metal covers for adjustment, giving proof against dust and leakage of grease. The floating rear axle construction used in all models has the driveshafts supported on Timken rollers, and the greatest improvement is the increased size of the internal and external brakes. In connection with the adoption of three-quarter elliptic springs in the rear, which is a change in harmony with several of the leading American makers this year, and which has been taken up by foreign makers during the last couple of seasons, is the use of a conventional torsion bar between the differential housing and the frame cross piece for absorbing the driving strain of the car.

FRANKLIN CLOSED CARS

Up to the present year the H. H. Frankling Mfg. Co., Syracuse, N. Y., has done little in the line of closed cars, but for 1909 a complete line of such machines is offered, consisting of an 18-horsepower two-passenger, interior-operated brougham; an 18-horsepower, six-passenger town car, built on the motor cab chassis; a four-passenger, 18-horsepower landaulet; a 28-horsepower landaulet and a 42-horsepower six-cylinder limousine—the largest closed vehicle of the line. In all of these the Franklin designed wood and aluminum bodies are used and the chassis employed are similar to those on the open cars except for the strengthening because of the extra load of a closed car, and lengthening.



WINTON 1909 FOUR-PASSENGER ROADSTER SIX



FIVE-PASSENGER KISSEL TOURING CAR FOR NEXT YEAR

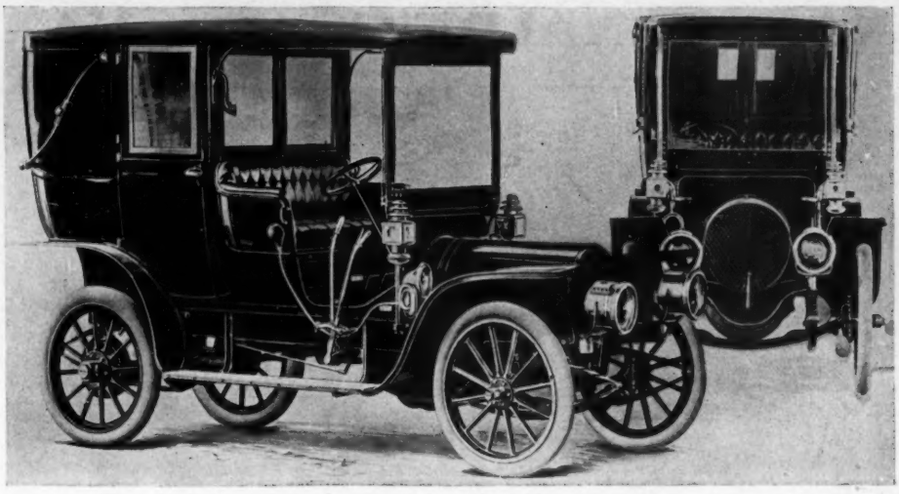
THE MYHTIB OVERCOAT

The Myhtib Composition Co., Hartford, Conn., manufactures a composition which has been designated "Myhtib Overcoat," which is applied to the outside of a tire casing the same as paint to the body of a vehicle. The composition is a solid and is applied when hot after melting. It is used on tires in the late fall when the car is put away for the winter season and is intended to prevent deterioration in the quality of the rubber during the winter season, when the car is garaged. After the Myhtib overcoating is applied the car should be jacked up so that none of the weight is on the tire. In addition to this preparation, the company markets inner tube patches, made of rubber which are cemented and ready for use. In applying one of these patches it is necessary, first, to clean the tire where the patch is to be applied with benzine. This done, hold the patch in the palm of the hand with the cemented side up, cover the cemented portion with hot or cold water and let dry for 1 minute, after which it is again covered with water and the patch held over the flame of a lamp with the cemented side to the flame. After heating thoroughly for at least a minute the patch is applied and held in position for 2 minuates, after which it is given 5 minutes in which to set, which completes the operation.

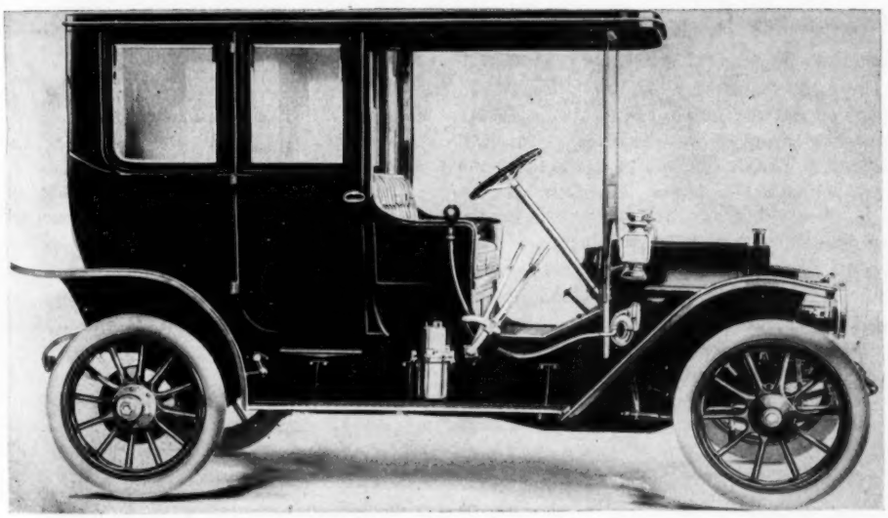
GABRIEL LINE FOR 1909

The Gabriel Horn Mfg. Co., Cleveland, O., will continue for next year its three products—the horn, cut-out valve, and shock absorber. Externally the outward appearance of the Gabriel horn is the same as the 1908 product, but a superior tone is claimed for it. By the perfection of the little device, it is possible to produce a musical tone for city use, and the pitch is such that the three notes can be

caused to rise in unison, which makes a penetrating warning for the country. This horn will be furnished in single tube, or three-note types, and in four sizes to fit different sizes of motors without causing back pressure on the engine. The cut-out valve, used in operating the horn, has been improved to avoid sticking. The instant the operating lever is moved the disk in the main channel begins to close and the disk in the branch channel, placed at an angle of 90 degrees, starts to open, the result being an immediate escape of the exhaust, causing the horn to sound. By removing the disk in the main channel a correct valve for cut-out purposes solely is secured, this giving an 1¼-inch escape opening in addition to the regular outlets. These valves are made to fit standard sizes of iron pipe or steel tubing, ranging from 1 to 2½ inches in outside diameter. The improvements in the shock absorber consist in the increased bearing surface for attaching to the angle plate on the spring, and a new method of fastening the stud to the friction pad by use of a case hardened block. This gives a ⅝-inch bearing on the stud which allows it to turn, thus taking care of the end motion the same as side links on a spring. These two features are claimed to eliminate noise or rattle which, in conjunction with the new friction material which is more effective than that heretofore used, a particularly improved device is the result. The company claims that severe tests have proven this new material capable of 12,000 to 15,000 miles service without replacement.



FRANKLIN LANDAULET FOR 1909 TRADE



CHALMERS-DETROIT LIMOUSINE DESIGN FOR 1909

MOTOR CAR LITERATURE

The Standard Roller Bearing Co. has issued a complimentary official guide of the University of Pennsylvania, which it is mailing to all its clients. The booklet is a good example of a novel method of a concern keeping its name before the public.

The 1908 Year-Book of the Automobile Club of Kansas City contains the constitution of the club, by-laws and list of members. It is a very commendably arranged booklet with purple cover and gold lettering.

The Winton 1909 catalog, headed "Winton Six," is in keeping with former booklets issued by this concern and is particularly attractive in every respect. It is argumentative in favor of six-cylinder design and contains much interesting data.

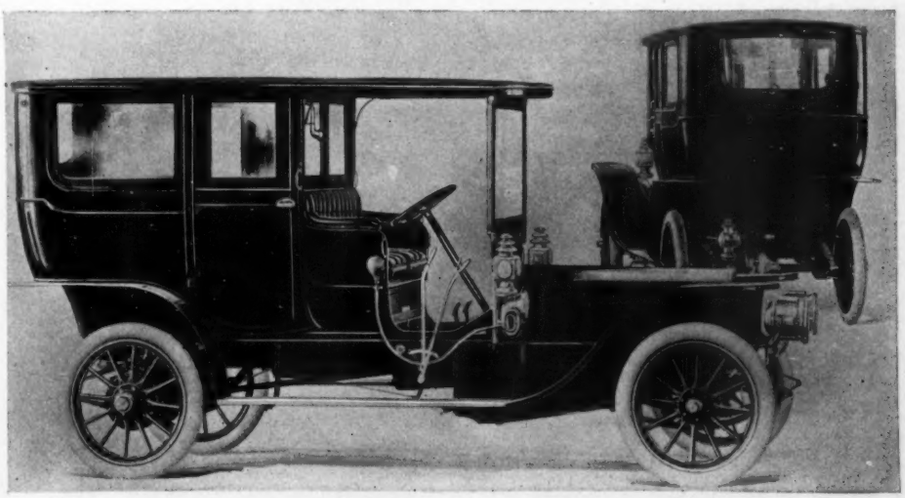
The Stewart & Clark Mfg. Co., Chicago, Ill., maker of Stewart speedometers, has an 8-page, large-sized folder on its 1909 models. In the large center page the six types manufactured are illustrated.

The September bulletin of the Automobile Club of Philadelphia contains several road routes in the city and viicnity, and has the plan and elevations of the new club garage.

The Lavalette Co., New York, has in the mails a large-sized catalog illustrating the different types of R. V. F. ball-bearings. Much information relative to bearings of this type is contained in this book.

CHALMERS-DETROIT LIMOUSINE

The Chalmers-Detroit 30 limousine is built on the regular touring car chassis but heavier tires are used and a lower gear ratio fitted. Features of this chassis are unit power plant with four cylinder cast en bloc, multiple-disk clutch, three-quarter elliptic rear springs and heavy brakes. The car seats seven persons and is finished in optional colors, Brewster green and Chalmers blue being the offered colors. The interior trimmings in black include goatskin seats, silk padded ceiling and silk curtains.



FRANKLIN 1909 LIMOUSINE TYPE

NAPIER SMALL CAR WITH MANY INNOVATIONS

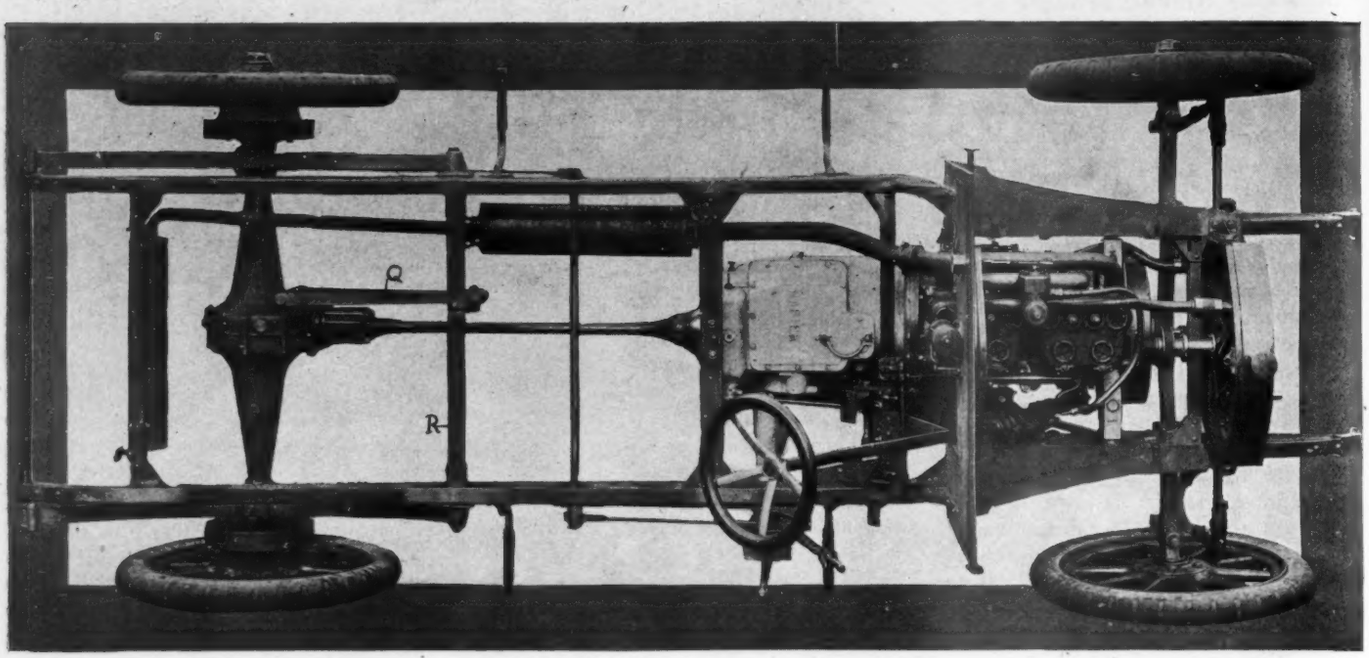


FIG. 1—NAPIER 15-HORSEPOWER SMALL CAR WITH WORM DRIVE

THAT the small-car fever has struck England as well as America is indicated by the small 15-horsepower four-cylinder Napier car, which is being marketed by S. F. Edge, for this concern. This car has many innovations. First comes the combined motor and selective gearset, with a flywheel in front of the motor, and the multiple-disk clutch entirely encased at A between the crankcase B and gearbox C. Close after this is noted the unique location on the left side of the magneto D, beneath it the water pump E, and in turn beneath this the oil pump F, which pumps the lubricant from the crankcase basement to all of the cylinder bearings, whence it returns to the pump, is filtered, and again circulated. Another novelty is the two-part carbureter, in which the float chamber G and the spraying nozzle are carried on the crankcase at the right with the mixing chamber H and throttle above the cylinder heads. The pipe K leading from the float chamber to the mixing chamber is waterjacketed at J through a part of its length. In connection with the gearbox attention is drawn to the integral sleeve L, which extends to the side of the car beneath the frame and carries the change-speed lever in its usual convenient location. This arrangement eliminates the drilling of the side member of the frame for these parts, which is frequently done on motor cars. The rear axle, Fig. 3, is an attractive construction of two parts, or bell-shaped halves M, which gradually taper from where they carry the spring seatings N to the centers where they are sufficiently enlarged to accommodate the spur pinions of the differentials. For cars sold in England and Europe, where road conditions are favorable, the drive from the propellorshaft to the rear axle is by worm and gear, the worm on the end of the propellershaft being carried beneath the differential as shown at P. When built for the American market, a bevel-gear drive to the rear axle is used, which gives increased clearance. The top view of the chassis, Fig. 1, shows a peculiar design of torsion bar Q, which attaches at its forward end to a transverse frame member R in line with the forward end of the rear springs, and is well splayed to span the differential housing at the rear. This torsion bar is particularly short, not being one-half the length of the propellershaft. The footbrake, positioned at the rear of the differential, is for all purposes an enclosed brake, in that it is encased underneath and at both sides by an extension S of the gearbox, Fig. 4, and is adjustable by wing nut T projecting through this

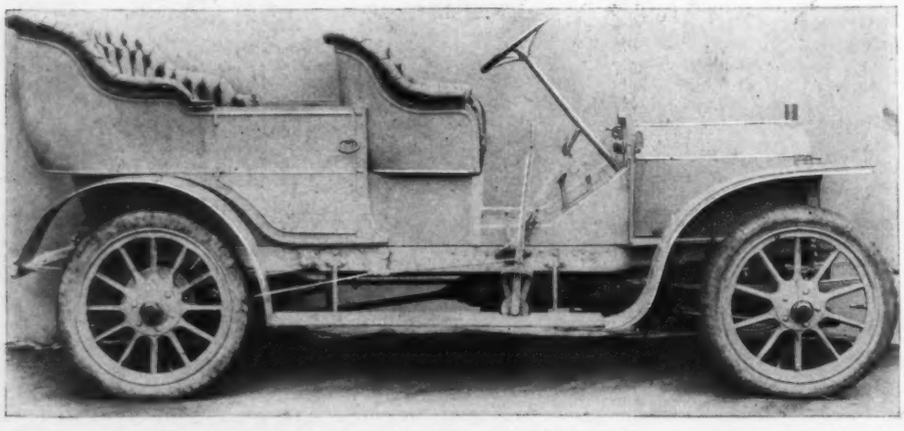


FIG. 2—SIDE VIEW OF NAPIER 15-HORSEPOWER CAR

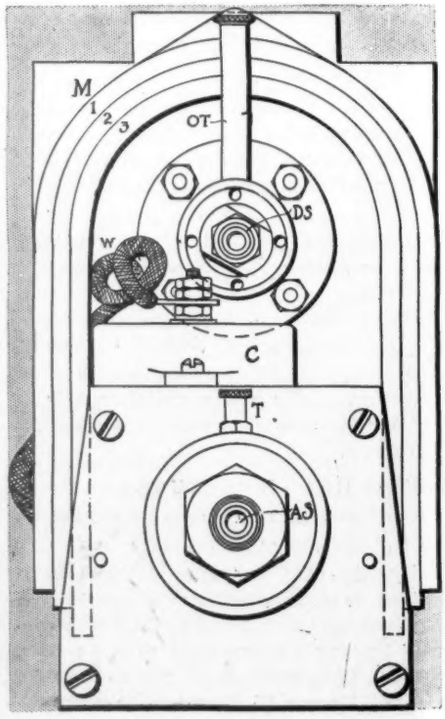


FIG. 1—VOLTA MAGNETO

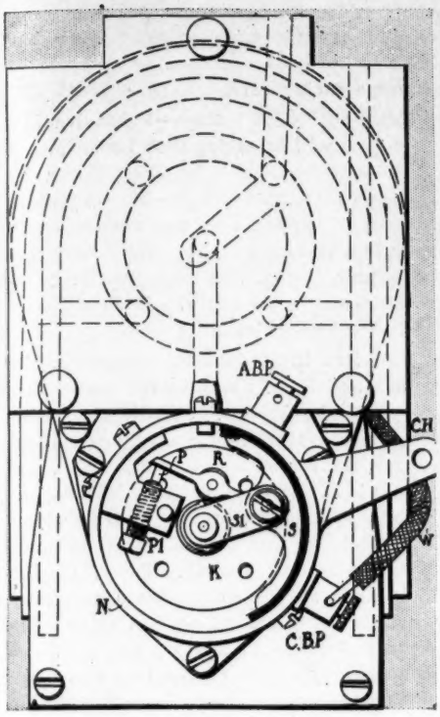


FIG. 2—VOLTA MAGNETO

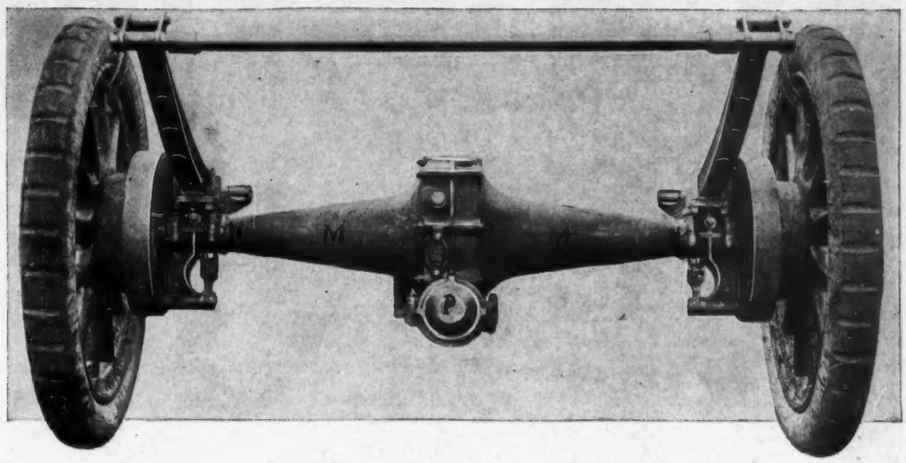


FIG. 3—REAR AXLE OF NAPIER SMALL CAR

gearbox extension at the left. The rear wheel brakes are expanding members and dust-proof drums which bolt to the solid steel hubs.

VOLTA HIGH-TENSION MAGNETO

One of the many American high-tension magnetos of the season that has been brought to the attention of the motor-buying public, is the Volta, marketed by the Witherbee Igniter Co., New York city. This magneto, illustrated in Figs. 1 and 2, is of the gear-driven high-tension type, the shuttle armature carrying two windings, a primary one in connection with the usual make-and-break mechanisms, and a secondary winding which has connections with the distributer for delivering the current to the spark plugs, the magneto thus being a complete ignition outfit in itself.

Fig. 1 shows the driving end with the armature shaft AS provided with a taper end for fitting on a driving gear or universal joint. The magneto has nine horseshoe magnets M arranged in three sets of three each, the members of each set being designated 1, 2, 3. Above the armature is the condensor C connected with the make-and-break mechanism by the wire W. Still higher and carried in the upper part of the magnet opening, is the distributer shaft DS driven by the usual one-to-two gearing from the armature shaft. Both the armature and distributer shafts are carried on Hess-Bright bearings, the lubrication of which is cared for by special oiling arrangements, the oil being conducted to the distributer shaft bearing through the oil tube OT, and that to the armature shaft through the tube P.

In Fig. 2 appears an elevation of the opposite end of the magneto showing the make-and-break apparatus contained in a brass casing with projections CH with which the timing control connects. In the make-and-break apparatus figure two hardened steel cams K with rectangular profile and spaced 180 degrees apart. These cams act upon a hardened steel roller R, carried on a breaker arm, which is pivoted at one end on the sector piece S. The opposite end of the breaker arm has a platinum point P which normally contacts with a platinum tipped screw P1, which is carried in a support attached to the casing N of the make-and-break device. The low-tension current is taken from the copper end of the armature shaft through a flat steel spring S1. This spring carries a carbon button which bears upon the armature shaft, as mentioned, and at the opposite end attaches to the sector S. Two binding posts CBT and ABT are in electric contact with the sector S and are carried on the make-and-break casing N. The lower binding post CBT connects with the condenser through the wire W and the upper one ABT is for a wire used in short circuiting the armature. The make-and-break casing N may be turned to a large arc to vary the timing.

The distributer part of the magneto is conventional, in that the large distributer gear carries a vulcanite facing on which is a fan-shaped brass distributing disk for contacting with the leads to the spark plugs. This distributing disk receives its high-tension current through a carbon brush bearing on it at its center of rotation. These magnetos are designed for driving in either direction and as all terminals used are of the push-in or spring type, the magneto can be removed or attached very quickly. They are gear-driven at the standard speed.

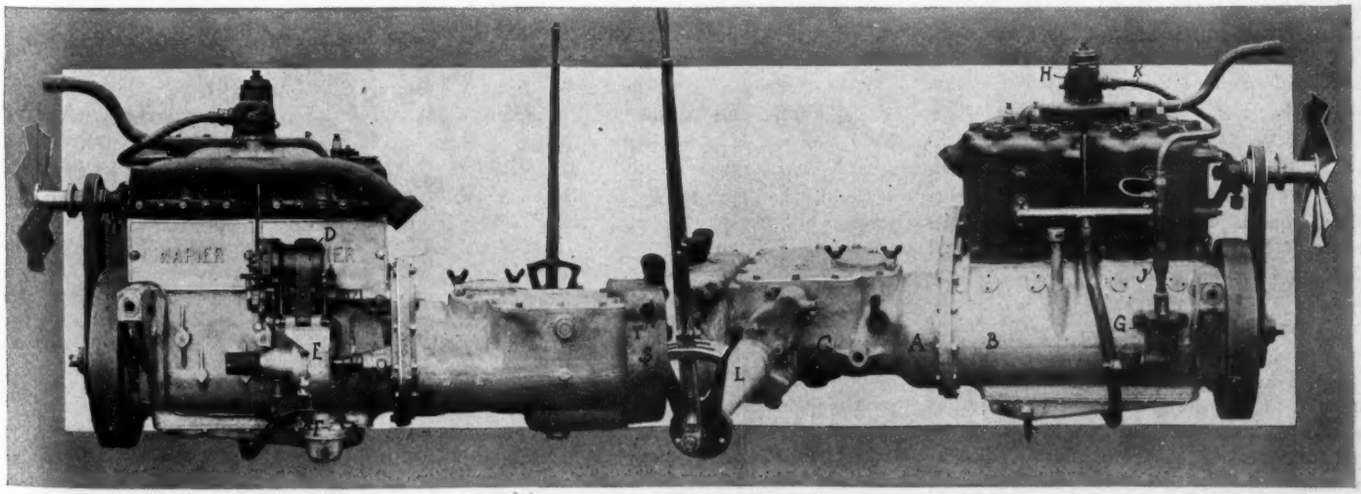
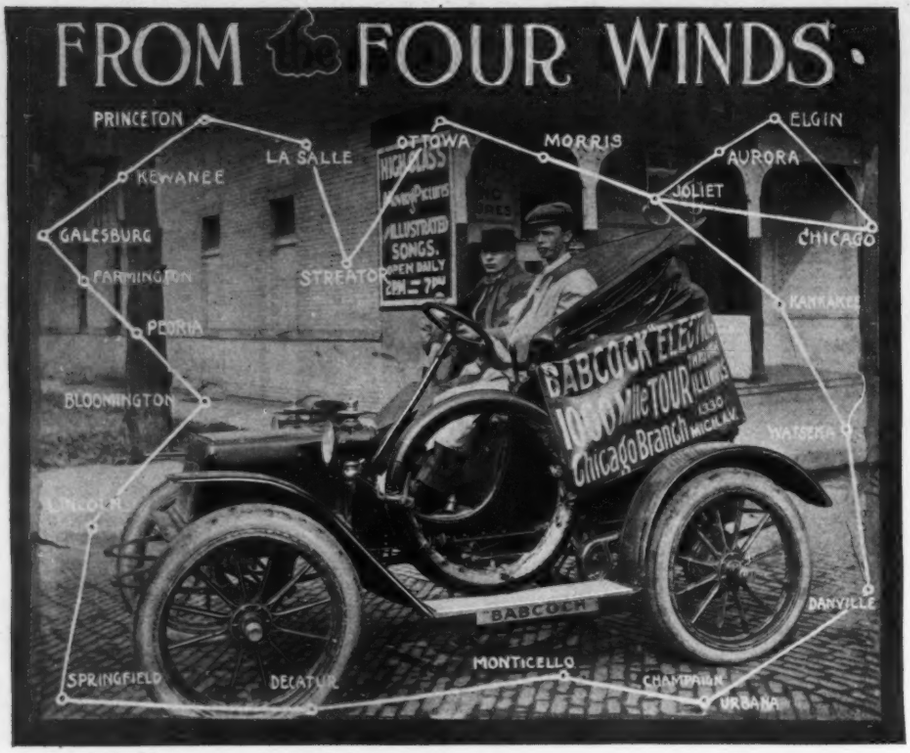


FIG. 4—LEFT AND RIGHT SIDES OF UNIT POWER PLANT IN NAPIER SMALL CAR



F. A. Babcock, Who Toured 1,244 Miles in Illinois in Babcock Electric

Road Record for Kissel—A four-cylinder 40-horsepower Kisselkar roadster, nicknamed Tabasco, recently broke the record from Los Angeles to San Diego, making 141 miles in 4:16:00, an average of 33 miles an hour.

Rental Car a Winner—An interesting incident of the recent Cleveland race meet was the victory of the Winton model A, made in 1905, over half a dozen other makes of current models. This particular model A is in rental service. After working steadily for 4 years, it ran into the track with a load of rental passengers, unloaded, lined up at the tape and won the track race.

More Road Bonds—Another batch of road bonds were sold by the county commissioners at Toledo last week, and the work of placing the county roads will proceed until all highways in the county are in satisfactory condition. The present award was of $20,000 of stone and gravel road bonds, which were sold to the First National bank of Cleveland at a premium of $485.

Road Work by a Babcock—F. A. Babcock, Jr., manager of the Chicago branch of the Babcock company, returned Saturday from a 5 weeks' tour through the state of Illinois, in which time he covered 1,244 miles, touching at the big towns on the circuit. Babcock took this method of visiting the different agents in his territory and doing practical missionary work by demonstrating to the general public the capability of the machine in traversing rough country roads. The highways he encountered were far from good and around Danville and Kankakee the sand was hub-deep. A new stunt in connection with this trip was the billing of each town in advance with eight-sheet posters and liberal advertising in the local papers, so the people of each town knew the car was coming.

Buffalo Club Still Growing—The Automobile Club of Buffalo, is in a flourishing condition. The membership committee met recently and acted favorably upon eighty-six new applications for membership to the organization. The members now number 1,476, and the club is still growing.

Non-Motor Stop Run—J. B. Knight, of the Pacific Commercial Car Co., of Tacoma, recently put a Chalmers-Detroit Thirty through a 500-mile non-motor stop test between Tacoma and Olympia, six trips being necessary in order to get the distance. The exact distance was 508 miles and the running time 25 hours 10 minutes. The gasoline consumption was 31 gallons, or an average of better than 16 miles to the gallon.

New York Climb Postponed—The New York Automobile Trade Association has been successful in having another resolution passed by the board of aldermen to suspend the speed regulations on Fort George hill for a set of speed trials. The contest committee has postponed this event from last Saturday to election day afternoon, which falls upon Tuesday, November 3. Several other changes to the program were made necessary by this action, chiefly among them being the withdrawal of the motor cycle event. This is done by reason of the fact that the Federation of American Motor Cyclists is holding its national championships on this date. The committee will add a special event open to four or six-cylinder gasoline stock chassis of any price or horsepower and the free-for-all event open to all types of gasoline racing cars.

Pennsy's 1909 Tags—Pennsylvania's 1909 tags will be white with black letters. They will be ready for distribution by December 15, and will be handed out in the order applications are received. Up to date a trifle more than 24,000 1908 tags have been issued, and next year it is expected that nearly 30,000 will be disposed of to Pennsylvanians.

Fine Run in Studebaker—Donald J. McIntosh and F. L. Estey in the Studebaker Scout and having Dr. C. E. Dutton, chairman of the tours and contests committee of the Minneapolis Automobile Club, and Richard E. Tucker, of the Minneapolis Tribune, as passengers, on Wednesday of last week set up a new record between Minneapolis and Duluth. The 174 miles over sandy rough country roads with some corduroy stretches of several miles, was made in 7 hours 32 minutes running time. The primary object of the trip was a desire on the part of Estey to look over the route between Minneapolis and Duluth with a view of reporting favorably on it to the touring committee of the A. A. A. at Buffalo, for use on the Glidden tour next summer.

Scared the Indians—Eugene Zundel, of the Crocker Chair Co., one of the largest concerns of the kind in the world, has the distinction of being the first man to run a motor car through the great government Indian reservation in northeastern Wisconsin. Accompanied by W. U. Rietow, of the Crocker company; C. H. Hartley, general manager of the Wisconsin and Northern Railway Co., which is building a line through the reserve, and three managers of Crocker lumber mills, Mr. Zundel drove his Winton through the reservation, much of the way through virgin forest. The Indians ran in fright at sight of the big car. The party inspected a tract of 15,000 acres of hardwood land owned by the Crocker company and spent nearly a week in the wilds of the reserve.

Safeguard Against Fire—Owners of motor cars who start by boat for Savannah on the specially chartered steamer will have fire protection en route and while at Savannah. Albert Segar Marten, manufacturer of fire-fighting apparatus, of the Tea Tray Co., of Newark, N. J., has undertaken to carry through a complete plan to protect those who ship cars south and those who have cars at Savannah either for racing or touring. Mr. Marten has established the Marten motor car fire department and will have on hand cars fitted out as fire engines. The extinguishers used will be similar in every way to those supplied by the Tea Tray Co. for regular service on motor cars and similar to those used at the 24-hour race when this service helped save the race for the Simplex in the closing hour and also saved the Garford car and the Renault car from de-

struction. Cars in the Vanderbilt cup race also will be protected by the Marten fire patrol. Two cars will be stationed around the course, one within 50 feet of the telegraph booth.

Gives Up Big Tour—The tour to have been pulled off by the Michigan State Automobile Association a short time ago and which was postponed has now been abandoned, the association finding it extremely difficult to secure entries, although several handsome cups were offered for the winners. It is hoped to pull off a tour next year.

Parades in Spokane—Two hundred and sixty high-grade cars ranging from electric runabouts to big touring cars, were seen in two parades in Spokane during the last few weeks. The first was when the Spokane chamber of commerce entertained 100 members of the Seattle chamber of commerce, including officials of the Alaska-Yukon-Pacific exposition, on a tour of the city, followed by a banquet in the Hall of the Doges in the evening. One hundred and thirty-five cars were in line. The second parade was during the Spokane interstate fair, when 125 cars were shown. Scores of cars were also used in conveying visitors to and from the fair grounds, where the total attendance was about 125,000 for the week.

Tours in a Pullman—Richard M. Shaffer, of the Shaffer Mfg. Co., has returned to Baltimore from a 5 weeks' tour through the mountains of West Virginia, western Maryland and Virginia. Shaffer found the roads good between Baltimore and Hancock, but between there and Cumberland, where he had to go over five mountains, they were the worst encountered in all his experience. On the return trip quite a distance was traveled over the northwestern turnpike, which was found to be in much better condition, except on two mountains east of Romney, W. Va., which were hub deep in sand. Shaffer went to Winchester, Va., and from there to Berkley Springs, W. Va., and at this point it was almost impossible to plow through the dust. Considering the road conditions, Shaffer thinks he can show two record runs—from Baltimore to Frostburg in less than 8 hours, a distance of 154 miles, and from there to Aurora, W. Va., 83 miles, in 4 hours 15 minutes. He covered more than 1,500 miles without a puncture or trouble of any kind.

New Motor Idea—A flying motor squadron was the feature of "tag day" in Milwaukee. The proceeds went to the Milwaukee Visiting Nurses' Association, and every prominent owner lent his machine for the swoop on the unsuspecting. Miss Seamon was in charge of the flying squadron and handled it with the ability of a club giving a race meet.

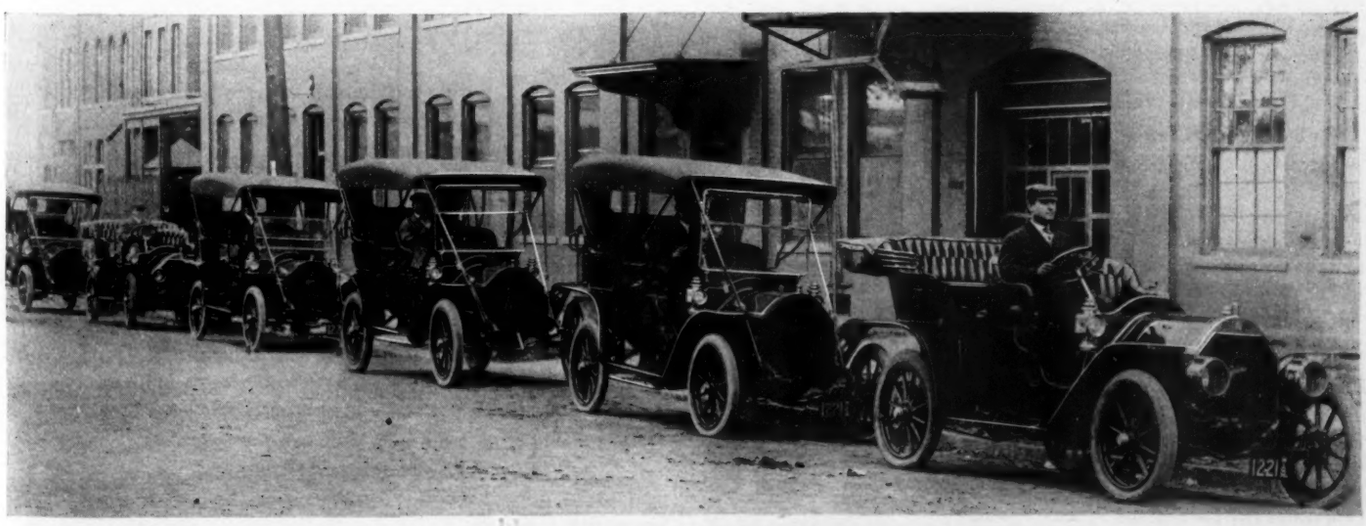
Maryland Officers—At the annual meeting of the Automobile Club of Maryland the following officers were elected for the ensuing year: President, Dr. H. M. Rowe; vice-president, D. C. Walker; treasurer, Ernest J. Knabe, Jr.; secretary, Frank W. Darling. Members of the board of governors: James S. Reese, M. S. Hess, C. H. Milliken, A. A. Piper, B. B. Friedenwald, R. M. Norris, Dr. H. M. Rowe, D. C. Walker, Ernest J. Knabe, Jr., and Frank W. Darling.

Praise From Fire Chief—Here is what Chief Thomas A. Clancy, of the Milwaukee fire department thinks of the motor car he uses to make fires and answer alarms: "It is in the long runs to the outskirts that the car shows its supremacy. In downtown streets, of course, the machine makes no better speed than a horse, but care must be exercised there. Traffic is heavy, and more cannot be expected. Street sprinklers cause considerable trouble to the car by making the pavement slippery. In going to a fire a few days ago my car skidded completely around on the slippery pavement. But it is not nearly so dangerous as skidding with a horse and buggy. I have had many narrow escapes that way. The great advantage of the motor car lies in the fact that it does not become exhausted, like a horse. It will go anywhere and everywhere; it carries one as easily as it does a party; it is tireless. When we are held up by bridges, we can make a detour in half the time it used to take me with my horse. It's the thing, and I wouldn't go back for the world."

Nyce Resigns—The increase of his law business has compelled Edwin S. Nyce, secretary of the Norristown Automobile Club, to resign, and William B. Hart has been appointed to succeed him. The Norristowners' country clubhouse at Jeffersonville, a suburb of Norristown, is nearly finished, and the members expect to take possession of it early next month.

Garages Must Be Fireproof—The common council of Fond du Lac, Wis., has passed an ordinance requiring all garages to be made fireproof, present buildings rebuilt and new ones according to the new code. It was at first decided to condemn all garages in the business district, but protests were made. The ordinance is the result of the recent $250,000 conflagration, the origin of which is said to have been in the Crescent Auto and Garage Co.'s building.

Vermont Club Growing—The Automobile Club of Vermont held its annual meeting at Montpelier last Thursday and there were seventy-five members present. The club is growing rapidly and it has 315 members on its rolls. There was a general discussion on legislation and other topics of interest to motorists and the general sentiment seemed to be that the present motor law in Vermont is generally satisfactory. The club voted to hold its next annual meeting at Rutland, an invitation having been received from W. H. Valiquet, of the Berwick house there, to be his guests. The election of officers resulted as follows: President, W. W. Brown, of Springfield; vice-presidents, A. G. Whiting, of Burlington, and J. M. Boutwell, of Montpelier; secretary-treasurer, L. H. Greene, of Montpelier, and C. H. Slocum, of Morrisville, director; J. M. Boutwell and G. E. White, of Montpelier, and C. C. Warren, of Waterbury, were appointed on the committee on legislation.



CADILLAC COMPANY'S FIRST 1909 MODELS READY FOR SHIPMENT

LACOIN CRITICIZES MOTOR TIMING

EDITOR'S NOTE—This following is a translation by Charles B. Hayward of an article by Louis Lacoin, and published in Omnia, a French contemporary. The article was occasioned by the appearance in France of a device known as the Larrad for indicating the proper timing of any motor. The Larrad timing device will be described later.

BEING conversant with the various questions of timing and the necessity therefor, we may now examine the diverse solutions which different designers have arrived at. In a table, we have grouped together the timing of a number of well-known motors, the order of arrangement being that of the increasing speeds. The slowest, the Ours, makes 1,000 revolutions per minute normally, while the fastest, the Sizaire-Naudin, turns at the rate of 1,700 revolutions per minute. These speeds are given in the last column of the table. The first four columns of the same table represent the lag or advance in the timing of the different essentials of a number of motors, counting in degrees from each dead center. The illustration, Fig. 1, shows what a degree is, the circumference of a circle having been divided into 360 degrees, also how the degrees of lag and advance, as shown by the table, have been calculated.

Each of the concentric circles is devoted to the timing of one of the motors, the smallest being that of the slowest motor, No. 1, while the largest is that of the Larrad, placed as in the table, at the last, for want of a better location, as its inventor considers its indications the best of all motor speeds. In short, the illustration represents two turns of the crankshaft, and in order to distinguish any particular timing, the point representing the lag given the opening of the inlet valve should be taken, this being found close to the upper dead center; then turning to the right around the circle until the lower dead center is reached, after which will be found the lag given the closing of the inlet valve. Continuing, the next point is that of the ignition advance, after which the upper dead center is again passed. Toward the end of the third half turn, the lead of the exhaust valve will be found, and after the last half turn, the closing of the exhaust. The regulation of each of the motors may be made in this manner.

In order to permit of an understanding of the whole, take each one of the different timing arrangements in the order in which they appear in Fig. 1. This method of procedure may appear to be the least logical, but it has the great advantage of progressing from the simple to the complicated. The lead given the exhaust is, in fact, the best known point in the timing of a motor, while the closing of the exhaust and the opening of the intake, times which frequently overlap, have values, which, according to different designers, vary by considerable margins.

LEAD GIVEN EXHAUST VALVE

The faster a motor turns, all other things being equal, the greater the amount of advance it is necessary to give the opening of its exhaust valve. It is a self-evident truth that if the speed of a motor be doubled, it travels twice as many degrees in the time necessary to lower the pressure. When considering different motors, as in this case, it is curious to note whether the same law has been observed, and the question may be put in terms of comparison for each one of the essentials of timing. It is this that has led us to adopt the classification of the motors by increasing speeds. So far as the exhaust is particularly concerned, a strange fact is to be noted in that the slowest motors, Ours—1*—has 55 degrees of advance, while the fastest, the Sizaire-Naudin—30—has but 44 degrees. The greatest advance, 62 degrees, is in the Mutel—11—which makes 1,300 revolutions per minute, and the least 30 degrees, is that of the Vinot Deguingand, which makes 1,500 revolutions per minute.

It is impossible to lay down an absolute law, but, generally speaking, it seems that the slowest motors shown in the table are those having the maximum lead. Whence this anomaly? Simply because it is essential in designing a fast motor, to allow large openings for the valves and large piping, and these may compensate for the diminution in the lead given the opening of the exhaust valve. It must be recognized, on the other hand, that the more the expansion is prolonged, the less advance is there possible, and the less noisily will the gases effect their escape. The Renault motors—28—perhaps owe to this fact their very silent running, as they have a lead of but 32 degrees. But it is well, before going further, to distinguish between the moment of opening and the manner in which it is done. We have here the sole data of the moment of opening, but the latter may be accomplished brusquely, somewhat like the pop of a champagne cork, or progressively, as where the same bottle is opened by slowly letting the gas escape round the cork. The second plan is less harsh, but slower than the former.

This comparison explains how we can have, side by side, and for identical motor speeds, the Aries—25—with a lead of 58 degrees given the opening of the exhaust, and the Vinot Deguingand—26—with but 30 degrees. The profile of their cams must be different. The dimensions of their valves may also differ, which is the reason why the advance of 52 degrees, fixed by the Larrad as the best for all motors, strikes us as somewhat exaggerated. However, this figure is not very far from the mean shown by thirty motors which we have examined, this mean being equal to 46 degrees 20 minutes. A motor regulated according to the Larrad would generally have to increase the lead given the exhaust, which in itself facilitates an increase in the speed.

LAG GIVEN THE INLET VALVE

The second column of the table gives the points chosen by various designers for the closing of the inlet valve. Some of them have adopted the dead center, but the reasons have already been given which give cause to hold a contrary opinion; one that is held by the majority of designers today. The Motobloc—5—and the Farcot—22—give but 10 degrees of lag, but the Vinot Deguingand—26—makes it 15 degrees, and a great number have hit upon close to 20 degrees as the proper amount, these being the Peugeot—13—has 18 degrees; Ours—1—Cornilleau Sainte Beuve—10—Rochet Schneider—19—Eudel—21—all four of which have 20 degrees exactly; Mutel—11—has 21 degrees; Rossel—3—has 23 degrees; Brasier—16—has 25 degrees—Renault—28—26 degrees. But those having a much greater degree of lag are also frequent, the Hotchkiss—7—having 33 degrees; Berliet—12—has 38 degrees; Panhard—6—has 40 degrees; de Dion-Bouton—20—has 45 degrees. The palm, however, if our information be correct, must be awarded the Peugeot—17—with a lag amounting to 58 degrees.

It is interesting to know how much reduction there is in the cylinder volume corresponding to such a great amount of lag in the closing of the inlet valve, and the sixth column of the table gives, for all the motors, the relation of the length of the connecting rod to the radius of the crank. This relation once known, permits of the drawing of a diagram indicating the position of the piston at each angle of the crank. The same result may, however, be arrived at through calculations. Thus we find that the 40-degree lag of the Panhard—6—corresponds to a displacement of the piston amounting to 18.7 per cent of its stroke; the 45-degree lag of the de Dion Bouton—20—represents 23.9 per cent, while the 58 degrees given the inlet of the Peugeot amounts to 38.4 per cent of its stroke. Thus the cylindrical volume of the Panhard cannot be utilized to a greater extent than 81.3 per cent, that of the De Dion 76.1, and the Peugeot but 61.6 per cent. In view of these figures, is it any wonder that one should be skeptical as to the ability of the theorist to give the power of a motor merely by inspecting its bore, and without even taking into consideration its stroke?

The motors that we have already cited would have with an equal bore, less power but a higher efficiency, were the inlet valve to be closed sooner. The Larrad, which allows but 17 degrees of lag, recommends a timing that would provide a probable in-

*The numbers following the names of the motors refer to their numerical classification in the table.

crease in power but to the certain detriment of the fuel consumption. On the other hand, this change of regulation would not be unattended by further inconveniences. The capacity of the dead space, in the motors in question, has been calculated with relation to the useful cylinder volume; that is, taking the quantity of mixture that can be imprisoned in the latter. By closing the inlet valve sooner, will it be possible to shut in a greater volume of gas? This increased volume must, nevertheless, be compressed in the same dead space and its pressure will exceed safe limits, so that after several months' running the inevitable carbon deposits that occur will give rise to self-ignition and the motor will knock. It would then be the wisest course to decrease the amount of lag given the closing of the inlet valve by the designer. But the advantages of the Larrad, on the other hand, are, in our humble opinion, well justified in the case of such motors as the Labor—14—and the Luc Court—15—in both of which the inlet valve is closed at the dead center. The compression of such motors must, in fact, have been calculated on the basis of their total cylinder volume, since when running slowly the cylinder would be almost full, while at an accelerated speed the degree of compression would diminish considerably, since the charge drawn in would not fill it to the same extent. But in giving 17 degrees of lag to the inlet, as recommended by the Larrad, the motor couple would be improved, and in consequence its power, so that its speed would be increased, and the motor would be capable of high speed, since the exhaust regulation recommended by the Larrad calls for a very early opening.

CONCERNING THE IGNITION DEVICE

The third column of the table contains, more than anything else, the word "variable." Fourteen designers, however, have given their motors a fixed point of ignition, but this point is far from being the same with all of them. Located 43 degrees in advance of the dead center in the case of the Cornilleau Saint Beuve, it is but 20 degrees away from that point in the Rochet-Schneider—19—and the Aries —25—so that the ignition advance may be said to vary more than 100 per cent. Here, again, is an anomaly similar to that which was pointed out in the case of the exhaust lead. In a given motor, the more its speed is increased, the greater necessity there exists for advancing the point of ignition. But the Cornilleau motor, with 43 degrees of advance, turns at the rate of but 1,300 revolutions per minute, but the Aries, with only 20 degrees, has a speed of 1,500 revolutions per minute. The sparking point in the case of the latter motor is probably located more centrally, and it may be also possible that the much faster rate of ignition comes from the greatly reduced dimensions of the motor itself. The mean average of the fixed ignition points represented in the table is found at 31 degrees, 15 minutes.

EXHAUST CLOSING, INLET OPENING

Now comes the most delicate point of the analysis, that concerning the closing of the exhaust valve and the opening of the inlet. Theoretically, these two points should succeed one another, the exhaust closing at the upper dead center and the inlet opening immediately afterward. Reasons have already been given why it is advantageous to close the exhaust valve but a few degrees beyond the dead center, and why the inlet can, without inconvenience, open but an instant later. It has been shown that the piston cannot drive the exhaust gases out of the cylinder except by compressing them to a degree in excess of that existing in the exhaust valve port and manifold. This excess of pressure may be very feeble, but it is indispensable. At the end of the piston's stroke, or upper

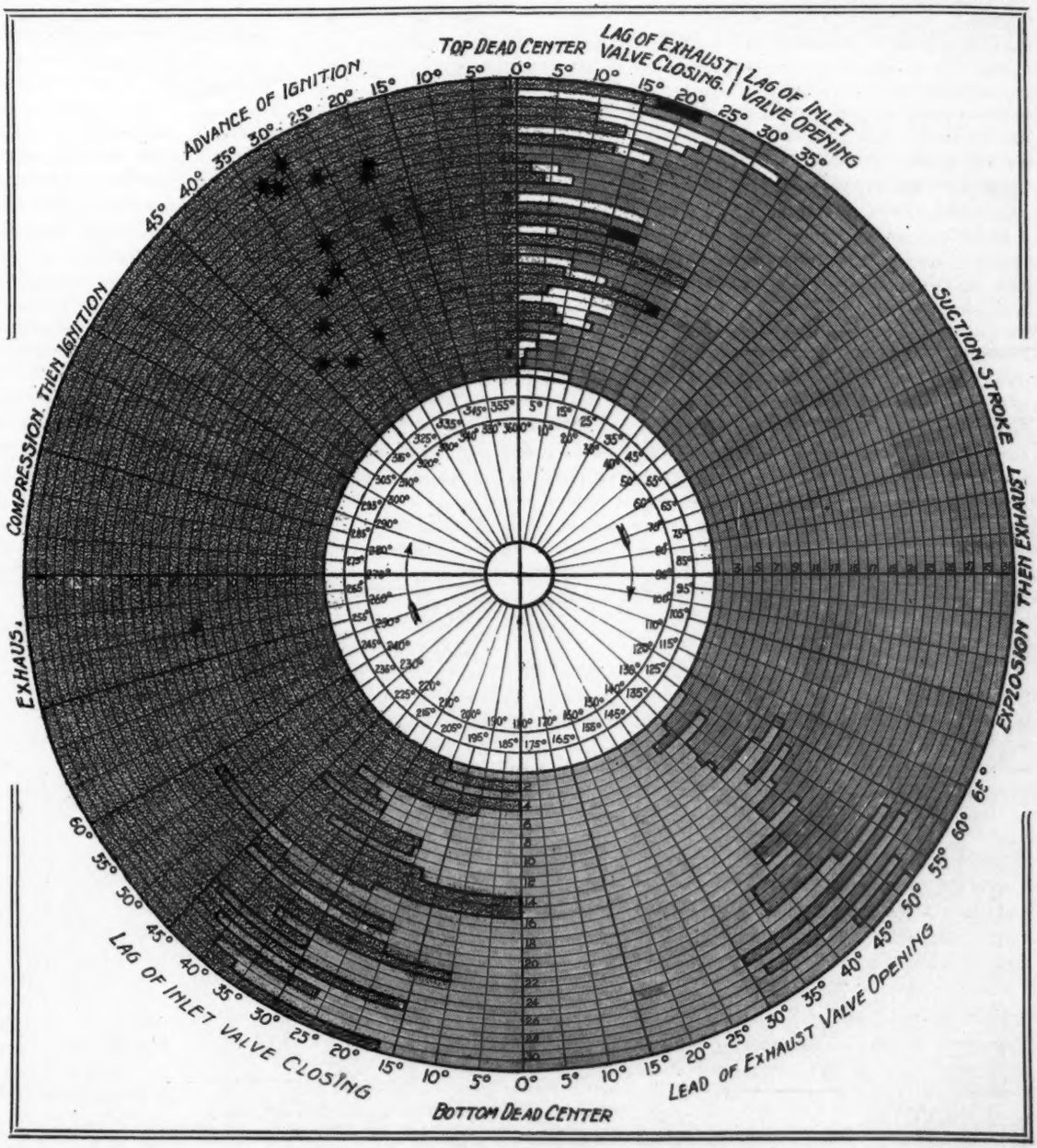


FIG. 1—SHOWING DIFFERENT TIMING USED IN FRENCH CARS

dead center, this compression still exists, no matter how little it may be, so that if the exhaust valve be closed and the inlet be opened at that instant, this pressure will prevent the entrance of the fresh gas; worse than that, the exhaust gases will penetrate into the inlet manifold. The movement in this direction is not accentuated, because the piston rapidly begins to aspirate, but it is none the less evil on that account.

However, such designers as the Panhard—6—Aster—18—De Dion—20—Chenard Walcker—23—and the Darracq—24—follow the errors which are here condemned. On the contrary, such as the Ours — 1 — Rossel — 3 — Gregoire — 4 — Brouhot—9—Peugeot—13— Brasier —16—Rochet-Schneider—19—Vinot Deguingand —26—and Sizaire et Naudin—30—all close the exhaust at the upper dead center, the inlet opening with a lag ranging from one degree in the case of the Charron—2—up to 20 degrees in the Brouhot—9. This opinion is upheld, thought somewhat timidly, by the Farcot—22—for example, with 2 and 6 degrees of lag respectively, and in a much more positive manner by the Sultan—27—with 14 and 22 degrees; by the Renault—28—with 10 and 23 degrees, and, above all, by the Unic—29—with 10 and 34 degrees. The Mutel—11—also opens its inlet valve very late, giving it 26 degrees of lag, but it closes its exhaust valve even later, with 28 degrees past the dead center. During these 2 degrees, both of its valves are open at the same time. This is a curious method of regulation, but it is one recommended by Larrad, who is of the opinion that the inlet should open 17 degrees beyond the dead center, while the exhaust should not close until 22 degrees have been traversed, or 5 degrees later. This brings up three questions:

1. At what point is it most advantageous to close the exhaust?

2. At what point should the inlet be opened?

3. Is it advantageous to close the exhaust before or after the inlet opens?

POINT OF EXHAUST CLOSING

It is well known that the closing of the exhaust valve should be after the piston has passed the upper dead center, but the amount of lag given it should not be as great as that given the closing of the inlet valve. Assuming that the excess pressure of the exhaust equals the depression during aspiration, the time necessary to complete the emptying of the cylinder will be proportional to the volume of gas contained in it. At the end of the admission the volume of gas contained in the cylinder is equal to the cylindrical volume, plus the dead space. Suppose that, for example, to be 1 litre, for a motor of which the cylindrical volume is ¾-litre, while the clearance has a capacity of ¼-litre. At the end of the exhaust stroke, the piston being at the upper end of its course, the volume of gas is only that of the dead space, or ¼ of what it was and it is accordingly natural to suppose that this excess of burned gas will escape four times faster than the fresh gas will begin to make its way into the cylinder. On the other hand, as the angles described by the crank are proportional to the time, it may be said that 20 degrees of lag given the opening of the inlet, to take a mean figure, should correspond approximately with 5 degrees of lag to the exhaust. In a previous article in Omnia, to which reference has already been made, the angles were 16 and 4 degrees. Those of the Eudelin—21—are 20 and 4; Berliet—12—

are 38 and 9, and the Unic—29—are 40 and 10 degrees.

It is evident that no absolute rule can be given here as the losses of the charge in the exhaust manifold are not necessarily equal to those of the inlet. When the muffler is at all choked up, the back pressure may be very high and this consideration has led Larrad to recommend 22 degrees lag in the closing of the exhaust, and 17 degrees for the inlet. This is probably exaggerated, the Renault—28—giving 10 degrees to the exhaust and 26 to the inlet, while the Motobloc allows but 5 degrees to the former and 10 to the latter. These designers give the exhaust a lag falling between ½ and ⅓ that which they allow the inlet. That is, the lag in each case is proportionately greater than those mentioned, without, however, going as far as Larrad recommends.

It would seem to result from the above analysis that the proper amount of lag to give the exhaust lies between 5 and 10 degrees. Ten degrees represent an appreciable angle and the time required for the crank to turn through it is not negligible, and an important quantity of exhaust gas may escape, but the piston is still very close to the dead center after the crank has traversed it. With a stroke of 100 mm.—3.93 inches—the piston has traveled but 1.5 mm., assuming that all the joints are free from play, but if the big end of the connecting rod has a little, to which must be added that of the upper end, there will be .2, .3 or even .5 mm. to subtract from that length, so that the piston will still be practically at the dead center when the exhaust closes.

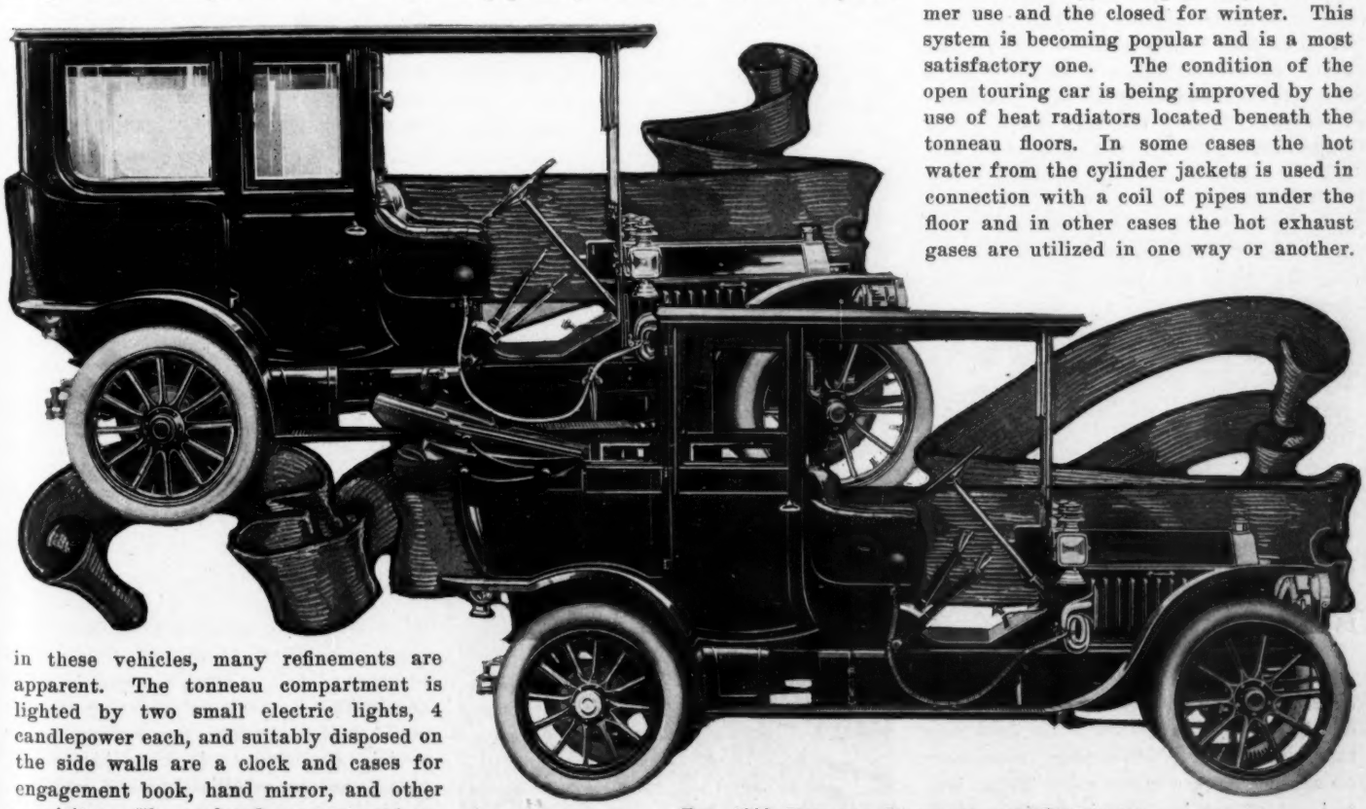
TIMING REGULATION OF A NUMBER OF PROMINENT FRENCH MOTORS

NOS.	Lead of Exhaust opening	Lag of Inlet closing	Ignition Advance	Lag of Exhaust closing	Lag of Inlet opening	Relation of conn. rod to radius crank	R. P. M. at full power
1—Ours	55°	20°	var	0°	15°	4.76	1000
2—Charron, 20-30 h. p.	44°	0°	.....	0°	1°	4.55	1100
3—Rossel, 40 h. p., 4 cyl.	38°	23°	.....	0°	2°	4.29	1100
4—Gregoire, 10-14 h. p., 4 cyl.	53°	0°	.....	0°	5°	4.18	1200
5—Motobloc, 24 h. p., 4 cyl., 100-120	45°	10°	.....	5°	10°	4.75	1200
6—Panhard—Levassor	45°	40°	.....	0°	0°	4.5	1200
7—Hotchkiss, 4-cyl. 95-100	44°	33°	.....	10°	17°	4.27	1300
8—Cottin-Desgouttes, 18-22 h. p.	46°	30°	38°	8°	15°	4.15	1300
9—Brouhot, 12 h. p., 4 cyl., 75-110	45°	45°	30°	0°	20°	5.	1300
10—Cornilleau—Ste-Beuve, 20-30 h. p.	56°	20°	43°	6°	20°	4.62	1300
11—Mutel, 40 h. p.	62°	21°	var	28°	26°	4.4	1300
12—Berliet, 22 h. p.	48°	38°	.....	9°	17°	4.5	1300
13—Peugeot, (Paris) 18-24 h. p.	58°	18°	38°	0°	10°	4.76	1300
14—Labor, 20-30 h. p.	51°20′	0°	var	0°	0°	4.18	1300
15—Luc Court	45°	0°	.....	15°	30°	4.25	1300
16—Brasier	45°	25°	24°	0°	7°	4.5	1350
17—Peugeot, (Beaulieu)	51°30′	58°	31°	20°	15°	4.78	1400
18—Aster, 9 h. p., 105-120	40°	40°	var	0°	0°	4.3	1400
19—Rochet-Schneider, 24 h. p., 100-120	40°	20°	20°	0°	20°	4.75	1400
20—De Dion-Bouton, 12 h. p., 4-cyl.	45°	45°	30°	0°	0°	4.7	1400
21—Eudelin	36°	20°	var	4°	8°	4.3	1450
22—Farcot, 14 h. p., 80-100	36°	10°	.....	2°	6°	4.	1500
23—Chenard-Walcker	36°	36°	.....	0°	0°	5.25	1500
24—Darracq, 10-12 h. p., 100-120	48°	30°	21°	0°	0°	4.5	1500
25—Aries, 14-18 h. p.	58°	44°	20°	13°	18°	4.91	1500
26—Vinot-Deguingand, 12-16 h. p. 80-110	30°	15°	27°	0°	15°	4.64	1600
27—Sultan, 9-12 h. p., 4-cyl., 75-110	58°	42°	32°	14°	22°	4.55	1600
28—Renault, 8 h. p., 2 cyl.	32°	26°	33°40′	10°	23°30′	4.33	1600
29—Unic, 20 h. p., 75-110	53°	40°	30°	10°	34°	4.6	1650
30—Sizare Naudin, 15 h. p., 120-110	44°	37°	var	0°	15°	5.25	1700
31—Larrad Device	52°	17°	.....	22°	17°	....	....

The motors are arranged in this table in the order of their increasing speeds. The angles are figured in degrees, counting from the nearest dead center. "Var" means that the point of ignition may be advanced or retarded by the driver.

INTERIOR VIEWS OF 1909 PEERLESS LIMOUSINE AND LANDAULET VEHICLES

THE importance of the limousine in the motor car field is increasing annually, and with the advent of the small car an unprecedented increase in this luxurious type of vehicle may be looked for. In the two types of 1909 Peerless closed cars—the limousine and landaulet—a careful study has been made of design, with the aim of incorporating comfort and weatherproof qualities to the greatest extent. Although radical changes are not observed in these vehicles, many refinements are apparent. The tonneau compartment is lighted by two small electric lights, 4 candlepower each, and suitably disposed on the side walls are a clock and cases for engagement book, hand mirror, and other requisites. The enclosed compartment accommodates five people, three on the rear seat and two on the folding type of seat. As compared with the limousine the landaulet has the advantage that the rear half of the top may be entirely thrown back in favorable weather, yet, for inclement days with this part of the top up, the protection is equal to that afforded by the limousine. In France and England, the limousine and landaulet have enjoyed a popularity not known in America, but which is coming. The open touring car is a most uncomfortable winter vehicle and the cape top swathed in front and side curtains with mica windows is a most undesirable proposition and one which is little of a decoration in any sense of the word. Many owners who cannot afford two cars—an open model, a limousine or landaulet type—follow the middle course of using one chassis with an open body and closed body, the open body for summer use and the closed for winter. This system is becoming popular and is a most satisfactory one. The condition of the open touring car is being improved by the use of heat radiators located beneath the tonneau floors. In some cases the hot water from the cylinder jackets is used in connection with a coil of pipes under the floor and in other cases the hot exhaust gases are utilized in one way or another.



THE 1909 PEERLESS LIMOUSINE AND LANDAULET

Legal Lights and Side Lights

EDICT FOR TAXICAB DRIVERS

Police Commissioner O'Meara, of Boston, last week issued an edict to the taxicab drivers of that city in which he notified them that they must observe the laws the same as drivers of other vehicles. He told them the temptation to run at rates dangerous to the public is great and they must resist this temptation. He reminded them that they are subject to all the regulations governing hack and cab drivers; that the drivers must wear the numbers assigned to them on their coats; that when assigned to special stands they must not trespass upon public stands and when not so assigned they must not trespass upon special stands; nor loiter in busy places or leave their cabs unattended or refuse to move them when so ordered. He concluded by stating that violations of law, ordinance, regulation or police rule would be prosecuted in court or by complaint to the commissioner according to the circumstances. The streets in Boston are so narrow that when a couple of teams or carriages are on one there is not much room in which to dodge around and the drivers of taxicabs have been doing the best they could to make time, so this may have led to some complaint to the commissioner, who accordingly has taken cognizance of the protests.

TESTING A ROAD LAW

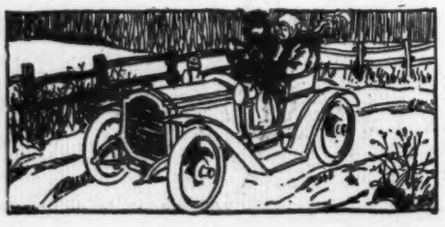
Whether or not the selectmen of a town in Massachusetts have the right to close a public road or highway to a motor car is to be decided by the supreme court. As a result of a collision on a posted road in Ashfield between a motor car owned by George H. Turner, of Charlemont, and a wagon driven by Walter Lesure, the selectmen of Ashfield were complainants in the district court against Mr. Turner for violation of the order which excludes motor cars from a certain highway. No damage resulted from the collision and the defendant testified that he consulted members of the board of selectmen, asking permission to go over the road to see his brother-in-law. While permission was not granted he said he was assured no trouble would follow. He was found guilty and fined $5 and immediately his counsel made a move which will take the case up for decision to the supreme court of the state, to test the constitutionality of the law of closing a public highway, which result will prove interesting to motorists.

IS EQUAL OF THE HORSE

That a motor car has the same rights as a horse-drawn vehicle was the opinion expressed in an interesting judgment rendered recently in Paris. The case was that of a tenant of a large apartment house who owns a motor car. To go into and out of the building it was necessary for him to stop at a large door which led into a covered hallway which itself has an exit to the street. The owner of the building claimed that the motor car always left traces of gasoline, lubricant, and also spoiled the pavement in the hallways, and, furthermore, caused an odor. On the other hand, this landlord allowed horses and carriages to use the hallway. The motorist brought suit for damages and his lawyer tried to convince the court that at the present time the motor car has become almost a necessity, as the carriage, and that no discrimination could consistently be made between the two classes of vehicles. The judge held the views of the lawyer as right and stated himself that the motor car has become or rather has established itself into the habits of the Parisian, and that it therefore has the same rights as the horse and carriage in the French metropolis.

INSISTS ON GUIDE POSTS

The Motor League of Rhode Island, which had its inception last spring during show time, is now thoroughly organized and has started in to do its work in the interests of motorists and motoring. It does not conflict with the Rhode Island club and some motorists are members of both organizations. George H. Huddy, Jr., is president, George C. Arnold treasurer and William W. Scott secretary. One of its first acts was to send a letter to every town clerk in the state asking them to report what action has been or is being taken by the town councils in the matter of posting guide boards at highway corners. The league intends to see that the law relative to placing these guide boards is lived up to, and as there is a penalty for failure it is not likely that the town officers will refuse to act. The league also has started to collect and tabulate information for its members and such information as it secures will be distributed to all motorists in the state and to those from other states who desire it. The league also has arranged with the Automobile Owners' Association of Massachussets to place the services of the latter's legal department at the disposal of any league members who may get into trouble while in the Bay State. A lapel button for members and an insignia for cars is under consideration by the Rhode Island league.



QUEER ANGLE ON TAGS

A very interesting situation regarding the license fee for motor cars has arisen in Washington, D. C., and it is probable the courts will be called upon to settle the matter. Quite recently the collector of taxes sent a bill for $2 to the disbursing clerk of the interior department, demanding pay for a license for the office motor car used by the superintendent of the capitol, and also a similar bill for a license for a motor cycle used by a departmental messenger. The acting comptroller of the treasury has ruled that the federal government need not pay the District of Columbia authorities for such licenses. The exemption granted the federal government is put upon the ground that the government is not bound by any municipal ordinance. In view of the fact that the district commissioners are not authorized to issue identification tags for motor cars or motor cycles except on the payment of a fee of $2 to the collector of taxes, and inasmuch as the acting comptroller says it is not necessary to pay the fee, the result will be that government cars will not have any numbers. This will cause considerable trouble, as cars which ought not to be exempted may thus escape the payment of the fee required by law. It may be that a solution of the problem will be found if the courts hold that the comptroller's decision nullifies the law found upon the statute books, in which case the district commissioners will issue the identification tags without the requirement of a fee of $2, which is now a prerequisite to the issuance of a license number.

WOULD REPEAL ROAD LAW

A bill has been introduced in the Indiana legislature, now in special session, to repeal the 3-mile gravel road law, passed at the regular session last year. The bill was introduced by Representative Miles Furnas, of Randolph county, and will be made the subject of a bitter fight, farmers being against the law and motor car owners and drivers in favor of it. The law forces county commissioners to build a road not to exceed 3 miles in length, providing it will connect two other improved roads. It is provided that the road must be built upon the petition of fifty property owners and that the expense is to be equally divided among the property owners of the county. Since the law went into effect thousands of miles of new roads have been built at a cost estimated at from $8,000,000 to $10,000,000. Within the last few months cities and towns have been ordering streets paved under the law, the expense to be paid by the county. It is to this feature that farmers are objecting and which is the bone of contention.

Brief Business Announcements

Albany, N. Y.—G. S. Ransom has taken the agency for the Lozier in this city.

Uplands, Cal.—John Rauch has been appointed agent for the Kisselkar in this town and vicinity.

Utica, N. Y.—The Westcoot Garage Co. has been appointed agent for the Lozier in this city.

Wilmington, Del.—The International Auto Cab Co., of Dover, has been incorporated with a capital stock of $500,000.

Newburg, N. Y.—The Newburg Auto Shop has closed a contract with the Lozier company for the representation of the Lozier in this vicinity.

Newark, N. J.—The Atlantic Motor Car Co., which has the local agency for the Stoddard-Dayton, has removed to its new salesrooms at 238 Halsye street.

Philadelphia, Pa.—The Goodyear tire agency is making preparations to enlarge its tire repairing department in order to meet the increased demand for this work.

Philadelphia, Pa.—The Olney Automobile Co., Limited, has been organized by H. L. Bastram, E. A. and W. H. Margerison, and will conduct a repair shop and also operate a garage.

Hartford, Conn.—The Shore Line Garage Co., of Branford, has been incorporated with a capital stock of $10,000, and will operate a garage. John T. Manson is named as one of the incorporators.

New York—J. H. Parsons has opened up an establishment at 1711 Broadway, near Fifty-fourth street, and will make a business of conducting an exchange for slightly used motor cars, motor cycles, etc.

Utica, N. Y.—Charles H. Childs & Co. have completed arrangements with the Jackson Automobile Co., of Jackson, Mich., whereby the local concern is to act as distributing agent throughout New York state for the Jackson car. This, however, does not include New York city.

Bridgeport, Conn.—It has been announced that E. A. Godfrey will retire from the Blue Ribbon Auto Co. in the near future and will devote his entire attention to the Blue Ribbon Horse and Carriage Co., of which concern he is secretary and treasurer. The motor car company will be conducted by William E. Seeley and Lieutenant Johannes Schiott.

Los Angeles, Cal.—In the future the Marmon is to be represented here by Woolwine & Anthony. The former Big Four Automobile Co. is to be merged into the new firm. A new garage is to be erected on Olive street, between Twelfth and Pico streets. For the present the new firm will devote its entire attention to the Marmon, but later on it is probable that several other cars will be added to the list.

Newark, N. J.—F. W. Briggs is soon to erect a garage at 390 Belleville avenue.

Philadelphia, Pa.—H. D. Benners has opened a branch agency for the Michelin tire at 320 North Broad street.

Newark, N. J.—J. W. Thatcher has sold out his interest in the Grout agency at 265 Halsey street to P. H. Johnston.

Lansing, Mich.—The American Motor Truck Co., of Detroit, has been incorporated with a capital stock of $10,000.

Cleveland, O.—G. A. Baumetz, the local agent for the Overland car, has bought the plant of the Detroit Auto Repair Co., on Detroit avenue.

Philadelphia, Pa.—Horace B. Mills, who has the agency for the Royal Tourist in this city, has removed to the new quarters at 604-606 North Broad street.

New York—F. C. Morgan has been appointed sales manager of the American Automart, of 1619-1621 Broadway. Extensive alterations are under way in the establishment.

Providence, R. I.—The Tufts-Justin Co., which was recently appointed agent for the Stevens-Duryea in this state, is now permanently located in its new salesrooms at Aborn and Washington streets.

Los Angeles, Cal.—The White garage is preparing to remove about December 1 to its new garage on Olive street, between Eighth and Ninth streets. The new establishment will accommodate more than 120 machines, and will handle White cars exclusively. F. C. Fenner is the president of the company; H. D. Ryus, vice-president and general manager; S. W. Bixby, secretary-treasurer.

Newark, N. J.—Non-Blow-Out Tire Co., capital stock $600,000; to manufacture motor car tires.

Chicago—Dan Canary Taxicab Service Co., capital stock $20,000; to maintain a motor car garage and livery.

New York—Cherry Autocab Co., capital stock $25,000; to operate a garage, manufacture motor cars, sell and rent motor cars, etc.

Jersey City, N. J.—Standard Universal Rim Co., capital stock $125,000; to manufacture and deal in metal rims, wheels and parts.

New York—Delaware Import Co., capital stock $100,000; to manufacture and deal in motor cars and operate a garage.

New York—A. W. Blanchard, capital stock $25,000; to engage in the manufacture of motor cars, etc.

New York—Walter Christie Automobile Co., capital stock $400,000, to manufacture motors, engines, machines, motor cars, carriages, trucks.

Newark, N. J.—Pope-Hartford Auto Co., capital $50,000, to manufacture motor cars. Incorporators, Benjamin C. Fincke, Shore Hills, N. J.; Henry E. Holt and Charles Dickson, 138 East 65th street, New York city.

Elizabethtown, N. Y.—F. A. and E. M. Marvin are about to erect a garage and workshop.

Los Angeles, Cal.—The Los Angeles Motor Car Co. has been incorporated with a capital stock of $50,000.

Nashville, Tenn.—The Tennessee Auto Co., of Davidson county, has been incorporated with a capital stock of $13,000.

New York—The Oldsmobile company has taken possession of its new headquarters on Fifty-eighth street, near Broadway.

Cleveland, O.—The Barger Auto Co., agent for the Cadillac, has leased the store on Euclid avenue formerly occupied by the Hoyt Millinery Co.

Pittsburg, Pa.—The Iron City Tire and Repair Co. has been appointed agent in western Pennsylvania, eastern Ohio and West Virginia for the G & J tire.

Providence, R. I.—Pugh Brothers are to open a new garage on Mathewson street. The building is now in course of construction, but will be completed in time for the spring trade.

New York—The Association of Motor Car Dealers, which has its offices in the Times building, has made an assignment to John H. Winans. The assets amount to about $4,000; liabilities not given.

Nashville, Tenn.—John J. Vertress, Jr., is about to go into the motor car business. A garage is to be erected on Broadway at a cost of $10,000, and a charter for the new concern has been applied for.

Baltimore, Md.—Frederick E. Devlin, who has been with the Philadelphia branch of the Foss-Hughes company, agent for the Pierce, has been appointed manager of the Pierce agency to be opened in this city.

Brooklyn, N. Y.—A permit has been issued to the Grand Avenue Garage Co. for the erection of a new concrete garage to be located on the west side of Grand avenue, south of Greene avenue. The cost of the new building is to be $15,000.

Newark, N. J.—Alexander Pashby, who was formerly with the H. K. Koehler Sporting Goods Co., has taken a position with the Buick Motor Car Co. and will be in special charge of the repair department during the coming winter.

Pittsburg, Pa.—The Consumers' Auto Supply Co. is a new concern which has opened up in the Bissel block. C. D. Mandille, formerly the manager of the motor car department of Kauffmann's store, is the president of the new company, and H. G. Kimmich is the treasurer of the concern.

TESTING TRACK USED BY MOON COMPANY AT ST. LOUIS

Makes Commercial Cars—The plant of the Gramm-Logan Motor Car Co. is located at Bowling Green, O., where commercial cars are being manufactured.

Garage Opened—The Schwartzburg-Bond Co. has opened a garage at 176-178 Thirteenth street, Milwaukee. The company will do a general delivery business, handle second-hand cars, storage and general repair work.

Lucius Tyler, Lecturer—Lucius Tyler, of the Boston branch of the Maxwell, has become a lecturer. Last week he delivered an interesting talk on motoring before a large audience at Biddeford, Me., and he expects to get a number of such engagements during the winter.

Castle Resigns—Fred E. Castle has resigned from the position of sales manager for Gray & Davis, and is now considering several promising propositions in which his trade experience of 15 years, first in the cycling and then in motoring, may be utilized to the best advantage. For the present he will continue to make his headquarters in Detroit, Mich.

Overland Expansion Plans—The Overland Automobile Co., of Indianapolis, Ind., of which John Willys is president and manager, has just purchased the plant heretofore used by the Marion Motor Car Co., located on West Fifteenth street and the Big Four railroad, Indianapolis, comprising a large two-story brick building equipped with modern machine tools. It is planned to devote this plant to the production of the six-cylinder cars entirely for the present, pending the construction of the Overland's new plant, for which ground has been acquired and plans completed.

St. Louis Show Date Set—Although its third annual motor car show is not to be held until February 15 to 20 inclusive, the St. Louis Automobile Manufacturers' and Dealers' Association already has appointed a special committee to secure a building in which to exhibit the display. While there are several structures suitable to house the exhibition, the committee is making special efforts to secure the new Coliseum, which has just been completed. However, on account of the absence from the city of some of the officers of the Coliseum, it has been impossible for the committee to make any definite arrangements, but at the next meeting of the dealers' association it expects to make a final report. J. J. Behen, chairman; J. H. Philips and H. B. Krenning constitute the committee.

Motor News from Roswell—J. Q. Cummins has started a garage and repair shop at Roswell, N. M. He handles the Maxwell and also has just added the E-M-F 30. The Roswell Automobile Co., which owns and runs the Roswell to Torrance motor mail and passenger line, is still handling the Buick, but has added the Chalmers-Detroit and Deere. It also has a vulcanizing plant.

Muncie Has a Plant—The Interstate Automobile Co., of Muncie, Ind., has been formed by Thomas Hart, George and William Ball, T. F. Rose, J. M. Maring and others, who have employed Claud Cox to design a car. The company has secured 40 acres of land in Muncie and is now putting under roof its first building, a structure of brick, steel and glass, 140 by 440 feet. By January 1 it is expected the company will be turning out cars.

Pope September Report—The September report of the receivers of the Pope Motor Car Co. has been filed with the United States circuit court at Toledo, showing a highly satisfactory condition in the conducting of that institution. The cash on hand September 1 was $214,250.18, while on September 30 it had been increased to $233,614.34. Cash sales during the month were $39,611.01. The factory pay roll was $8,310.46, while the office pay roll was $3,264.17.

Harrison Adjudged Bankrupt—William Harrison, president of the Harrison Automobile Co., the Harrison Wagon Works and the Harrison Land Co., has been adjudicated bankrupt by Judge Swan, of Detroit, sitting in the United States district court at Grand Rapids, Mich. The matter has been referred to Kirk E. Wicks, referee in bankruptcy, and schedules of assets and liabilities will be filed with him. The case, which was one in involuntary bankruptcy, was begun by creditors of Harrison after the Harrison Automobile Co. had proved a losing investment and was against Harrison personally. Harrison filed an answer in the case and demanded a jury trial. Before the case was heard, however, Harrison died. The court has now decided that Harrison was a bankrupt at the time of his death, the demand for a jury having been withdrawn by the estate and the matter having been heard by the judge.

Has Franklin Too—The Standard Automobile Co., Packard agent at Cleveland, has taken the Franklin for the coming season. F. A. Stock, formerly with the previous Franklin agents, has also attached himself to the Standard company.

Huntington After Service—Within a short time it is probable that Huntington, Ind., will have a motor car transit service in lieu of a street car line. J. C. Curtis, general manager of the C., B. & Q. railroad, has applied to the Huntington common council for a franchise to operate motor cars over the city streets. It is proposed to place four cars in service at first, charging a 5-cent fare, and Curtis has agreed to assist in improving the streets of the city.

Testing Track For Moon—A 1-mile private track is one of the unusual facilities that the Moon Motor Car Co. has for testing out its cars. This course is owned by Joseph W. Moon, president of the concern that bears his name, and his associates. At one time the track was the property of the St. Louis Fair Grounds Association. Moon cars, after they have been tried for their hill-climbing abilities on a rough 21 per cent grade, are tested for speed, and smoothness of operation, on the historic race track.

More Reo Buildings—Three more modern buildings are among the recent additions at the factory of the Reo Motor Car Co., Lansing, Mich. Considerable new machinery and numerous new labor-saving devices also have been added recently to the operating department. "Immediately after R. M. Owen & Co. gave us their record order for 1909 model Reos, which was more than double that of any preceding year in our history, we effected plans whereby we should begin to make shipments under the 1909 arrangements by October 15," says R. E. Olds, president of the Reo Motor Car Co.

Places Apperson Agencies—G. H. Strout, sales manager of the Apperson Brothers' Automobile Co., Kokomo, Ind., has completed a tour of the west in which he established several agencies, among which are H. O. Harrison & Co., 1214 South Main street, Los Angeles, Cal.; Seattle Automobile Co., Seattle, Wash.; Tobin Motor Car Co., Denver, Colo.; J. H. Mease, Salt Lake City, Utah; Hartung-Larson Hardware Co., North Yakima, Wash.; Pioneer Motor Car Co., Kansas City, Mo., Capon Motor Car Co., St. Louis, Mo. In addition Strout has practically decided upon representation in Colorado Springs; Spokane, Wash.; San Francisco, Cal.; Minneapolis, Minn., and San Luis Obispo, Cal. The company also has arranged with Willis, Haywood & Holcomb, Indianapolis, Ind. Mr. Strout reports a big demand in the west for small cars and the medium-powered car of the

six-cylinder type. In parts of the west the demand in new territories seems to be more for the big five and seven-passenger cars than for the small one. Roadsters and tourabouts are not nearly so popular as in the east.

Hoosier Opening—The Cadillac Automobile Co. formally opened its garage and salesroom at 23 East Ohio street, Indianapolis, Monday evening, October 19. An orchestra provided music and souvenirs were distributed. Recently the company exchanged locations with the Knickerbocker Auto Co. and the building has been remodeled and a new front, with large display windows, put in.

Will Sell Second-Hands—A new idea in Minneapolis circles has come to the top in the organization of the Twin City Auto Exchange Co., organized to deal exclusively in second-hand machines and to conduct a general garage business. W. H. Raisbeck and F. W. Starr are the incorporators. For the present the concern is located in the building occupied temporarily by the Stoddard-Dayton agency, which will move between now and the first of the year to its new home on Hennepin avenue. The Exchange company will then entirely remodel the building on Sixth street, putting in the latest machinery and new elevators.

Jordan Company Reorganizes—Announcement is made by the Jordan Auto Co., which handles the Franklin line, that it has been reorganized and from now on will be known as the Bingham-Jordan Auto Co. George Bingham, the new member of the firm, is from Britton, S. D., where he was interested in several banks and also owned and operated the largest grain farm in the state. For the present the new concern will remain at its present location on South Fourth street, but it is not unlikely that a change will be made before the first of the year which will take the company nearer the new center of motor car business on Hennepin avenue.

Matheson Stockholders Meet—The meeting of the stockholders of the Matheson Motor Car Co. was held in Wilkes-Barre last week and a number of changes were made in the officials of the concern, due to the recent organization of the selling company, which necessitated the withdrawal of Charles W. Matheson from the presidency of the motor car company to take charge of the affairs in New York of the automobile company. The list of directors is the same for this year as last, except that John C. Bridgeman, of this city, and E. S. Fretz, of Pottstown, were elected to fill the vacancies caused by the withdrawal of the Palmers, of New York city. The list of directors now includes J. W. Hollenback, I. M. Thomas, John A. Turner, Asher Miner, W. C. Shepherd, H. Nelson Bennett, W. H. Son, Frank Matheson, Charles W. Matheson, John C. Bridgeman and E. S. Fretz. Colonel Asher Miner was elected to the presidency of the motor car company, succeeding Mr. Matheson; J. W. Hollenback was elected vice-president; Frank Matheson was reëlected secretary and given the title of general manager as well; R. Nelson Bennett was reëlected treasurer, and Daniel C. Mackay was made assistant treasurer.

Fire at Burlington, Wis.—The plant of the Verstraete-Fyfe Co., manufacturer of parts and accessories, at Burlington, Wis., was damaged $20,000 by fire last week. Special arrangements have been made, however, for immediate resumption in temporary quarters, and the business will be little inconvenienced.

New Minneapolis Concern—Announcement is made that another motor car company will be started in Minneapolis. The Matheson Auto Co. of Minnesota has been incorporated by local men to handle the Matheson line. Those in the deal are Charles F. Robinson, capitalist and mine owner; Arthur Armatage, secretary of the Underwriters' Association; Robert Rose and Henry L. Seiple, of the Minneapolis Victoria Vibrator Co. The new Minnesota Matheson company has 7,000 feet of floor space in a modern building at Hennepin and Fourteenth streets.

Waverley Sale Approved—During the last week the United States court at Indianapolis approved the deeds and bill of sale of the Pope Motor Car Co. to the Waverley company, thus formally transferring the former company's property in Indianapolis to the latter. The new company is preparing to make an effort to get its share of the electric vehicle business next season and within a short time will have 500 employes at work.

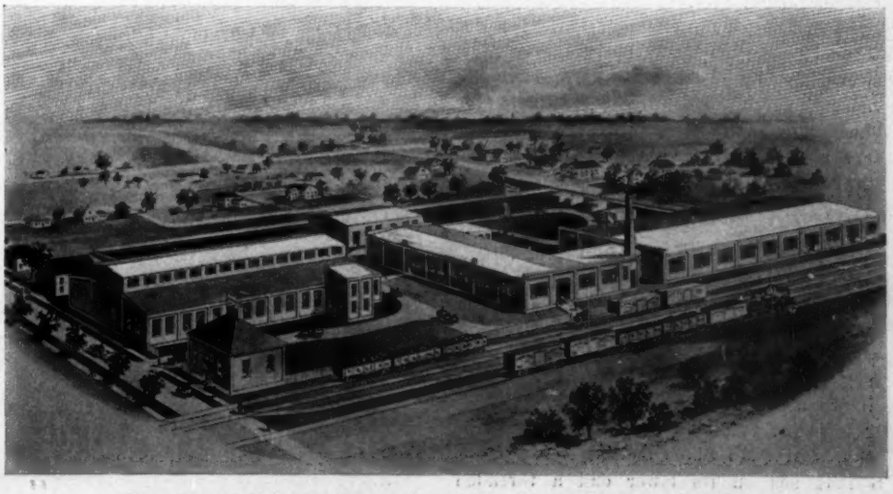
Chance for Motor Cars—The Southwestern Kansas and Oklahoma Implement and Hardware Dealers' Association's annual convention in Kansas City December 8, 9, 10, will include a motor car show. The implement and vehicle dealers in the southwest are taking a great interest in cars and the object of having this exhibition at the same time as the annual convention is to enable dealers to select cars they want to handle during the coming year. For the purpose of giving this exhibition the association has secured an auditorium in which the exhibition space is 50 by 120 feet with a seating capacity in addition of about 1,000. This show will be held December 8, 9, 10 and 11. In other words, it will last 1 day longer than the annual convention.

Stratton Reorganizes—The H. C. Stratton Co., of Boston, has been reorganized and incorporated under Massachusetts laws and it is now the Kissel-Kar Co., with H. C. Stratton as manager and Charles Small as secretary. The company has moved into its new quarters.

Dick Sells Out—M. R. Dick, who for years has conducted one of the largest garages in Minneapolis on Eighth street north, within a block of the new center of motor interest on Hennepin avenue, has sold out his business, the firm now being Gale & Wilson. Gale is from Wheaton, Minn., and Wilson has been associated with Dick for several years. Negotiations are under way to secure the agencies for two lines of cars.

Big Iowa Enterprise—The Iowa Auto and Supply Co.'s new garage at Maquoketa, Ia., is now under construction and will be completed by December 1. The building will be 50 by 80 and will be constructed of white pressed brick. Carl P. Banck, the manager, has closed a contract with the Cadillac company for three counties—Dubuque, Jackson and Clinton—in Iowa and will conduct garages in the cities of Dubuque, Clinton and Maquoketa, Ia.

Carriage Maker Converted—The Union Carriage Co., of St. Louis, which for the past 17 years has been putting 15,000 horse vehicles on the market annually, now announces that it will build 500 motor cars during the coming season. The first lot of twenty-five cars is now coming through the factory and will be ready for shipment to agents in about 2 weeks. The Union car will be guaranteed for a year from date of the original purchase. The officers of the company are George E. Deeds, president; W. C. Ingram, vice-president; George A. Laws, secretary; John B. Keough, treasurer.



PLANT OF THE GRAMM-LOGAN MOTOR CAR CO. AT BOWLING GREEN, O.

Development Briefs

THE MILBRADT WIND SHIELD

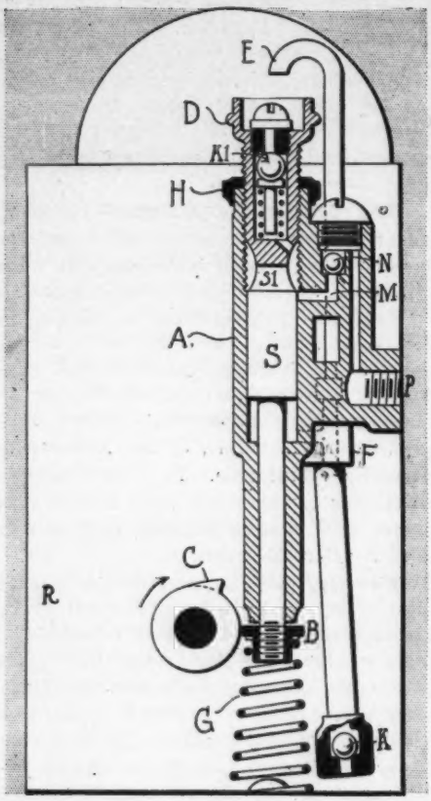
The Milbradt Mfg. Co., St. Louis, Mo., manufactures a two-part wind shield in which the upper half is so supported that it can be swung completely in rear of the lower half by simply loosening two thumb screws on the side of the shield and swinging the shield as desired. This is made possible by having the iron supporting the upper half hinged at the center of the ends of this half. When in position, along side the lower half of the wind shield, the upper half is inverted and coinciding as it does with the lower half there is little framework to obstruct the view. The frames carrying the glass are of hardwood material, the fixtures are of brass and the upper part of the shield, folding as it does toward the inside, will work on machines irrespective of how close the steering wheel may be to the dash.

THE MOORE COMMUTATOR

The Palmer-Moore Co., Syracuse, N. Y., manufactures a simple timer which is partly illustrated herewith. It consists of a brass sleeve A, with a broad flange at the top, a fiber disk B and a brass back plate, or disk, D. The contact pieces C are hardened steel cups, which may be removed by unscrewing the stud which anchors them in the disk. The revolving cam piece, not shown in the illustration, is a hardened steel member readily removable. The wires attach beneath the commutator body instead of above it, the clips F coupling direct on the studs of the contact pieces C. In advancing or retarding the spark the fiber disk B and the brass back plate D rotate the flange between them on top of the sleeve A, affording the necessary friction to hold the timer in any desired position. The method of attaching this timer to the camshaft is as follows: A short stub shaft is fitted into the brass sleeve A and carries the revolving cam, and the inside of this stub shaft is a slotted taper sleeve. This is slipped on the end of the camshaft and tightening the screw in the stub shaft draws up the taper sleeve, thereby gripping the camshaft. This timer is particularly light, weighing but 10 ounces, and with the exception of the steel cam piece, the four contact pieces C, and the fiber disk B, it is made of brass.

McCANNA MODEL D OILER

The McCanna Mfg. Co., Chicago, Ill., has ready for 1909 its model D mechanical lubricator made in any number of desired feeds, and intended to be driven from the front, rear, or end, through ratchet or rotary means. Its operation is exceedingly simple, a sectional illustration showing how it is done. In this illustration A is the pump casing, in which reciprocates a piston S that has on its lower end a threaded washer or flange B. In operation the



McCANNA 1909 LUBRICATOR

plunger S has to be raised and lowered. It is lowered by the cam C, which is on the driveshaft of the oiler, contacting with the flange B and pulling it down, and immediately the cam C slips the spring G forces the plunger S up. This is its complete operation; the cam pulling the plunger down, the spring forcing it up. On the upstroke of the plunger, oil is drawn from the reservoir R, past the check valve K, through the tube and into the pump cylinder A beneath the piston S. On the downstroke of the plunger S this oil in the cylinder is forced through the opening F and up through the vertical tube to the nozzle E, whence it drips into the receptacle D, the driver having an opportunity of noting the drop which constitutes the sight feed feature. Also on the down stroke the plunger, through suction, draws the oil past the check valve K1, thus filling the cylinder space S1 above the plunger, so that on the following upstroke this oil is forced through the channel M past the check valve N and out through the opening P to the bearing. In order to vary the amount of feed for each pump the lock nut H is loosened and the portion D threaded up or down in the cylinder A, thereby increasing or diminishing the space S1, which is the same as the quantity of oil delivered to the bearing on each stroke of the plunger S. The reservoir R is made of pressed steel and enameled in any color to suit the requirements.

RADIATOR PROGRESS

The Rome-Turney Radiator Co., Rome, N. Y., formerly the Long-Turney Mfg. Co., builder of radiators, has tripled its capacity for the 1909 season and is prepared to make 50,000. In addition to its regular manufacturing department a quick repair department has been added for the benefit of any make of radiator that reaches that department.

CALDWELL'S TIRE PROTECTOR

E. P. Caldwell, Waterloo, Ia., manufactures a dual tread tire protector, in which the tread consists of two steel tires placed side by side and of the same width as used on buggy wheels. These steel tires are riveted to steel cross ties which curve downward at their outer ends, conforming to the curvature of the tire sides, thereby forming a clamp to hold the protector in place on the wheel. These clamps attach to side pieces, which anchor to a ring paralleling the clincher rim of the tire. This protector is adjustable in diameter, so as to be suited to varying diameter of wheels. Using a pair of steel tires to constitute the tread of the protector, is advanced by the maker as a great step in the securing of easy riding, and the two steel bands are also claimed to avoid skidding entirely.

B. & S. STEEL SCREW DRIVER

The Billing & Spencer Co., Hartford, Conn., is marketing a new screw driver, which is a steel drop forging in one piece, with the point carefully tempered. It is an "all-steel" affair with a special design of handle to give an easy grip. Being all steel and in one piece there is nothing to loosen or get out of order. It is made in eleven sizes.

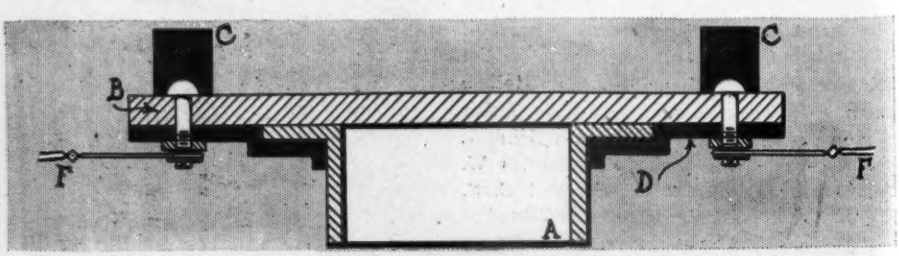


DIAGRAM OF MOORE COMMUTATOR